medical journal university of toronto

december 1976

University of Toronto
Library. Serials Dept.
Toronto. Ont.
M5S 1A5

medical journal
university of toronto

Established December 1923
An Undergraduate Publication

VOLUME LIV
NUMBER I

STAFF

EDITORS-IN-CHIEF:	Alan Ing 7T8 Susan Ross 7T9
MANAGING EDITOR:	Ugo Gizzi 7T8
CONTRIBUTING EDITORS:	Frances Frankenburg 7T8 Kirby Hsu 7T9 Nick Rizos 7T8 Molly Wills 7T9
RESOURCES:	Jeffrey Davidson 8T0
ISSUE EDITORS:	
DECEMBER:	Molly Wills 7T9
JANUARY:	Kirby Hsu 7T9
FEBRUARY:	Susan Ross 7T9
MARCH:	Nick Rizos 7T8
APRIL:	Alan Ing 7T8
ART, GRAPHICS, and COVER:	Lynn Waldo, AAM Robin Hamilton, AAM

CONTENTS

INTERVIEW – Vivian Rakoff	page 3
Chemical Aphrodisiacs	6
Elective Circus	9
Physician Incomes	10
BLUNT DISSECTION – Vivisection: is it worth it?	15
Crohn's Disease	16
BOOK REVIEWS	19
Feedback	22

THE COVER: The labyrinth, symbol of the mind of man, suggests this issue's feature topic, psychiatry.

PATRONS

For their generous financial support (with its consequent psychological boost) we would like to extend our sincere thanks to the following individuals:

Dr. Ulo Ambus, Toronto
Dr. Michael A. Baker, Toronto
Dr. B. Lynn Beattie, Toronto
Dr. John A. Beswick, West Hill, Ont.
Dr. J. L. Brayley, Mississauga
Dr. C. B. Brown, Toronto
Dr. Donald J. Currie, Toronto
Dept. of Surgery, University of Toronto
Dr. Rodney S. Fowler, Toronto
Dr. F. H. Fraser, Burlington, Ont.
Dr. A. Freiberg, Toronto
Dr. Irvin Gollish, Toronto
Dr. A. L. Halpern, Mamaroneck, N.Y.
Dr. W. J. Horsey, Toronto
Dr. Mary Jackson, Toronto
Dr. Fred L. Johnson, Hamilton
Dr. Ben I. Johnstone, Michigan
Dr. James H. Kerr, Don Mills, Ont.
Dr. H. F. King, Midland, Ont.
Dr. R. G. Kunkel, Noranda, Quebec
Dr. P. B. Lindsay, Woodstock, Ont.
Dr. L. Loach, Toronto
Dr. Bruce Marshall, St. Mary's, Ont.
Dr. J. F. Murray, Toronto
Dr. D. V. McFarlane, Toronto
Dr. R. H. Penney, Toronto
Dr. C. Phillips Rance, Toronto
Dr. Robert B. Salter, Toronto
Dr. Ruth Sky, Toronto
Dr. D. A. Stewart, Toronto
Dr. Marjorie C. Swanson, Toronto
Dr. Daniel G. Vaughan, San Jose, Cal.
Dr. M. S. Wolochow, Regina, Sask.

GUIDELINES FOR PUBLICATION

1) All articles intended for publication should be submitted to the editors before the deadline which is usually *one* month before the release of the Journal.
2) Submitted articles should be typed (or legibly printed) double-spaced; single-sided on paper 8½" x 11" (letter size) and they should not be more than 15 to 20 pages (3000 to 4000 words)
3) Illustrations, graphs, diagrams, figures and photographs should be put on a separate sheet and identified by Arabic numerals. A list of explanatory legends for all the figures and diagrams should be put on another sheet. Do not write on the back of photographs.
4) References should be checked with the original sources, designated by Arabic numerals in the text, numbered in order of appearance and put on a separate sheet. Each periodical reference should include in order: the author's name and initials, title of the article, Journal name, volume number, page number and year. (e.g., 1. ROSEN HJ: Lumbar invertebral disc surgery: review of 300 cases. *Can. Med Assoc J., 101: 317, 1969.)*
5) The editors reserve the right to make such editorial changes as are deemed necessary to ensure correctness of grammar and spelling, clarification of statements and conformity to Journal style.
6) Acceptance for publication is subject to the understanding that such material is submitted solely to the Journal, and will not be reprinted without the consent of both the editors and author.

An Interview with Vivian Rakoff

Molly Wills, 7T9

Dr. Vivian Rakoff has been Professor of Psychiatric Education for the last two years, in an association with the University of Toronto that began in 1968. He has given more than a dozen CBC radio and television talks on such topics as laughter and creativity as well as several original plays and films, and is the author of professional papers on topics including alcoholic emergencies, concentration camp survivors, obesity, death, and—most frequently—the family. He holds a B.A. and an M.A. in psychology from the University of Cape Town, received his M.B. B.S. from the University of London, and became a Fellow of the Royal College of Physicians and Surgeons of Canada in 1964 while associated with McGill University and the Jewish General Hospital. Married to a physician, he is the father of three children.

Journal: What is psychiatry?
Rakoff: When I was a medical student, a neurologist told me rather bitterly, "Everything is neurology when they can't do anything with it." I suppose it could also be said that everything they can't do anything with, they send to psychiatry.—But that's a flip answer, and it isn't completely true.

I think in order to understand what psychiatry is today one has to take a fairly broad view of what medicine is, and what it has been in the past. The Flexner report in 1911 emphasized that the physician should become a physician-scientist. It was marvellous, because it had the effect of giving standards and giving structure to the fairly inchoate apprenticeship-cum-witchcraft, which physicians had at that time. It was revolutionary; it was appropriate; and the whole curriculum of the science-oriented physician was established and became an orthodoxy.

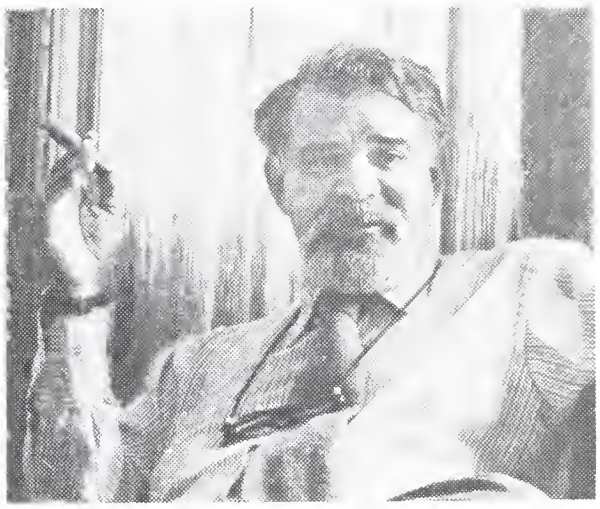
But there is a paradox which we have to face. Before we became physician-scientists we could do very little, but we were held in much greater esteem. Until the eighteenth century, about all physicians could do was relieve pain with morphine and its derivatives; if you were very skilled you could cut for the stone; you could do an amputation with the help of alcohol narcosis; you could make the bowels work or stop 'em up; you could prescribe a few wound-healing agents; but essentially that was it. The rest was mumbo-jumbo.

Scientific knowledge about the body, circulation of the blood, had been known only since Harvey, which in historical terms is yesterday. Eighteenth century: inoculation against smallpox, William Withering and digitalis for the heart; I think that's about it. Then came the nineteenth century, the discovery of anesthesia, the scientific theory of pathology, probably the most important thing that ever happened in medicine, Pasteur, and Claude Bernard and the great German scientists of the body—and medicine took off.

Yet the paradox is, that before medicine took off, people gave much more respect to the physician. You could almost draw two intersecting lines. One you could call regard for the physician, and the other you could call medical knowledge. They're like diagonals in a parallelogram. The more knowledge became rational and scientific and applicable by formula, the less it would seem was regard for the physician.

Journal: Did the physician somehow change the basic nature of his task when he became a scientist?
Rakoff: Yes; a lot of his success came from excluding himself. The triumphs of modern medicine are the loss of terror for random infection, the disappearance, almost, of childhood infection, and painless surgery. People shout, "That's not enough. That's not what I want from the doctor." Of course that's what they want from the doctor, but they want something else too. It's as though an important part of the physician's identity became lost in this very necessary and remarkable triumph of scientific medicine.

The part of his identity that was lost is that part which was split off from the original priestly identity. In a lot of cultures the magician-priest-healer is one person, and in the western world, at one time, he was one person. In Greece if you really wanted to be cured



A paradox: before we became physician-scientists we could do very little but we were held in much greater esteem."

"The medical model led us to ask questions about the biochemistry of affective disorders, about genetic patterns in schizophrenia."

"There is a psychological equivalent to a rectal examination. People tell you about their sexual aberrations . . . or even about crimes."

you didn't go to Hippocrates, you went to the temple of Aesculaepius and you slept there. The priests were literate, but it wasn't just a question of literacy; it was the giving over of a non-rational need for reassurance, for comfort, to some authoritarian figure.

These traditionally go with a magic elevation above the ordinary. Not that the priest himself may be that special, which is a warning to the physician in later times, but that he has a mantle placed upon him by virtue of a function. It's given to him a peculiar kind of trust, so that people in need can come to him as a social facility, if you like.

Journal: Surely the physician's task was quite different from the priest's.

Rakoff: The physician differed from the priest in one very important aspect: that he was able to use the entire technology of a given civilization for the relief of discomfort, whatever its source, but without that attribute of moral judgement that the priest had, so that he was safe to go to even when you had a boil on your bum.

Journal: Do people want the same thing from modern physicians?

Rakoff: People still want us to respond to their suffering. And they haven't read the textbooks, you see, many of them, and despite the over-medicalization of North American society, the things people bring to their doctors would in formal terms have nothing to do with the physician-scientist: trouble with my husband, I'm feeling old, trouble with my wife, trouble with my parents, frustration on the job, feeling weary in the evening because your wife is sexually rejecting you, though these days it's usually the other way around—that kind of thing, so that people still impose a role on the physician.

Medicine is the final common pathway of a great deal of science, but these sciences are in the service of a role which people expect you to fulfill. For laboratory tests they'll go to a lab. What they want from you whether you like it or not, is still someone who carries about him or her something of the old physician-priest/priestess.

At the same time there is a populist movement: you know, that your doctor doesn't really know anything; just make him/her a person. And yet at the same time they don't want that. This is a curious fact: there's a howl for certainty and then a refusal to accept the doctor's simple humanity. It is a problem for every physician, because if we really believe what our patients think of us, many of us would walk about a foot above the ground, and you've got to be very careful not to confuse yourself with the role you're performing.

Inevitably, along with priests and lawyers, you learn a lot of stuff that nobody else in society ever hears. Part of the social role is a kind of solemn, atavistic sense that you are outside the ordinary laws of society. You tell the doctor things that you don't tell anybody else. You do things for the doctor that you don't let anybody else do. A rectal or vaginal examination, or an examination of the hernial orifices, requires an incredible degree of trust.

Journal: Yet physical things, even with this degree of intimacy, raise no question of moral judgement. Do you think it's possible to be equally non-judgemental about psychological things?

Rakoff: I was going to say there is a psychological equivalent to having a rectal examination. People tell you about their sexual aberrations, or unusual sexual needs and desires, or even about crimes.

How you are judgemental is very peculiar. When it's a matter of the patient's health, you tell him, or her: this heroin is going to kill you. If you go on stealing like this the kind of tension you're putting yourself under is impossible. Or you could say, I don't go for that.

But in your role as a physician you have to be in a curious way separate from yourself, and it's difficult: difficult not to be pompous and too much your persona, and at the other extreme it's difficult not to impose your own reactions.

If you've ever seen a Bartholin cyst incised, it's as if all the stench of hell was in one place. But you are not entitled to vomit in the patient's presence. You are not entitled, while examining it, to say, Yucch. You wash your hands, you cleanse the parts, you examine them as if you were examining the patient's earlobe. And that distance which seems to be coldness is in fact part of your equipment of compassion. Going home and telling your spouse, "Yuuch! I almost threw up today," is the moral equivalent of the physician in battle knowing he must treat the soldiers of the enemy in the same way as he treats his own.

Of course that's a counsel of perfection. People get in the way. Every society has parameters within which it operates, and none of us is immune. It's the margins of the role that I'm talking about.

Journal: Is medical training necessary or useful to help a person deal with suffering which is essentially psychological?

Rakoff: Ah, but you don't know from which sector, from narrowly organic to most intricately and diaphanously psychological, the causal agent is operating. A psychiatry split off from medicine would be confined to—we are not quite sure what. People still come with these problems to psychiatrists. They also come, it is true, to psychologists and social workers, but the medical training is important.

It's important not because of what you already know, because you forget a lot, but it gives you a kind of sensitization, because you don't forget everything. And second, it allows you to be responsive to changes in the field.

Some examples from the twentieth century: GPI, general paresis of the insane, was considered as a purely psychological disorder until Wagner Jaurich (he got a Nobel prize) found out about tertiary syphilis and its relationship to GPI. An incredible finding. Thousands of people were in mental hospitals for myxedema until the relationship between myxedema and psychotic states was established. The recognition of what looked like hysterical paralyses in people suffering from porphyria. The curious odd fugue-like states of people who happen to have an islet cells tumour of the pancreas, so that they are overwhelmed by insulin and may be nearly comatose.

If you don't know about insulin and you don't know about the pancreas you can't ask the questions. You can only perceive what you expect to perceive. The more models you have, the more likely you are to have a model that fits your patient.

Journal: Is this the sense in which a psychiatrist has more to offer a patient than his own family physician can? Because he has more models, psychological and physical, to choose from?

Rakoff: Probably. One, he has time; by definition that is his role. Second, he should have more expertise in the psychological expression of disorder.

These narrowly organic examples only illustrate a starting-point. If we didn't use this medical model, which refuses paradoxically to recognize a mind-body dichotomy, we would not have been able to ask the sorts of research questions which have recently led to the working-out of genetic patterns of affective disorders; it would not lead us to ask questions about the biochemistry of affective disorders, the biochemistry of schizophrenia, genetic patterns in schizophrenia.

More to the point, if we do not include the new knowledge about human behaviour in the medical curriculum, we are going to be cutting off the medical student and the physician from a whole new technology which may not immediately be applicable to suffering, but which may in the future be the heuristic model for asking the question that *will* lead to relief of suffering. For exam-

ple, before John Bowlby clearly delineated the business about maternal attachment, and the disruption and depression in the lives of little children in pediatric hospitals, hospitals kept parents out. It was a contribution from behavioural science, if you like, based on a theoretical position that the early years are terribly important, that has altered the whole practice of medicine as far as children are concerned.

To make the point clear: until after the war, no medical school taught biochemistry. Why? Because there was no biochemistry to teach. Until recently nobody taught behavioural science, whatever its manifestations or whatever it means, because there was very little of it to teach.

I think that a physician today who knows nothing about learning theory, who knows nothing about human development and its proper stages, who has not kept up with the literature about human attachment not only as it affects little children but as (it is also appearing) it affects the adult, is missing a big part of his equipment. This is what patients come to ask you about. You don't just have to go on hunch any more.

The same thing applies to human

sexuality. People come to their doctors for advice in an area that doctors are rarely any more equipped to know about than plumbers. In fact less, because plumbers know about plumbing, and it's often a matter of plumbing. Psychic plumbing.

So what I'm saying is that it's very important for medicine and for patients that there be a specialist group who are interested in psychic subjects, with an openness to all the possibilities of cause, and therefore of therapy. The most exciting advances in psychiatry are coming from two ends: one, in this behavioural science-ethological stuff, and on the other side, the rapidly-developing knowledge about organic factors and genetic factors in the various psychiatric disorders.

Journal: If the physician was valued most highly when he was most priestly, why are psychiatry and general practice the least well-paying branches of medicine and least acclaimed within the profession? Are psychiatric disorders somehow felt to be unimportant?

Rakoff: No, it's not that. I think it has to do with the fact that a lot of psychiatry operates in an area of uncertainty. It's a real paradox that neurology is always respectable and psychiatry suspect.

Neurology has much learning, but unless you're a neurosurgeon, there's almost no condition for which you can do anything. Whereas in psychiatry your knowledge may often be very shaky, yet it's remarkable how many people say "I feel better".

Living with ambiguity can be difficult, but I think if we confess our lack of certainty, there's nothing wrong. Science means only to be as certain as you can. To give things up because they're not hard and fast, would be an abandonment of swarms of patients.

My favourite example is this: aspirin was discovered toward the end of the nineteenth century and was used, though nobody knew quite why it worked until about four years ago when prostaglandins and their relation to the inflammatory process were uncovered. Pragmatically we know that people who come and talk to somebody feel better afterwards.

It is a fact: suffering shared for human beings is very important. There's no reason to feel you should always be doing something grand; psychiatry, like the rest of medicine, has its common cold and its pneumonia.

Journal: What other factors could there be in the psychiatrists' lack of "respectability"?

Rakoff: The patients are the walking wounded of the world. People whose psyches are damaged are much more damaged than those whose legs are hurt. The central person is gone. Perhaps it's a bit like undertaking: it's a necessary function, but nobody quite likes to be around to undertake.

Journal: Perhaps it's also because—as I was told years ago—a third of the patients get better, a third get worse and a third stay the same, whether they go to a psychiatrist or not. But this is probably true of physical disorders as well.

Rakoff: I was going to say the same. This is true of many disorders. In fact it's only very severe disorders that need a physician, and most medicine is concerned with chronic cases.

Chronic heart disease—they don't get better. You carry them. Asthmatics—you carry them. Diabetics—you carry them. Much of orthopedic surgery—you carry them. And the fact is that in the major psychoses it isn't a third and a third. The fact is that you can do something about anxiety.

But even in conditions in which this is true, you don't have a licence not to do what you can, as long as you don't bluff yourself and the patient and the world that you know more than you do and that you can do more than you do. And with recent advances there are many people you can be of assistance to—as long as you don't promise them what the guru promises, that they will turn into perfect beings.

I'm contented with functioning, or a little less pain. But I have a fairly gloomy view of life, in that I think that one is very lucky to get by without too much disaster. It's that kind of vision that I suppose I've tried to impart to patients who come with subtle torments about themselves.

I think one of the reasons psychiatry may have lost some of its credibility with many people is what it promised: it promised so much. People were prepared to psychiatrize everything and everybody in the entire world. That doesn't mean we don't have opinions about things, and maybe informed opinions. But they should be delivered with some kind of "Now here I'm talking like anybody else", or "This is the way I think it is."

Journal: It seems to be hard to interest medical students in behavioural sciences.

Rakoff: Ah yes, but the interest is growing, and as the behavioural sciences develop more and more "hard" knowledge, they will make themselves more respectable in the curriculum. Right now students are most often interested in what they think of as the hard stuff which paradoxically may be intellectually the most challenging but pragmatically the least useful part of their education.

Journal: I suppose the people who are interested in the "hard" specialties want some guarantee of cure, and an intricate technology. Cures can also be ambiguous in psychiatry.

Rakoff: That's right; they'd be very frustrated. If you're not interested in process, don't touch psychiatry. If you require an immediate reward for your activities, this isn't your game. But if you're interested in process, if you're interested in detective work, if you have a pleasure in human variety, and if you're nosy and a voyeur, then psychiatry is for you. It's like watching a series of constant plays written by a master like Chekhov.

It takes time . . . and there are risks.

But if you don't want risks, go and make shoes.

Psychiatry is infinitely fascinating. ■

Chemical Aphrodisiacs

Larry Shemen, 7T8

The flourishing scientific and commercial pursuit of aphrodisiacs in recent years reflects an expanding psychological need. The stimulus has been an apparent increase in sexual dysfunctions[1], generally attributed to the stress of high urban population densities and greater social pressures. Equality for women is preached on the streets, and must also be practised in bed; that is, the physiological end result of a sexual union must include the female's orgasm. With this demand, increased stress is placed on the male and more cases of inadequacy are uncovered[2].

The term 'aphrodisiac', has wide interpretation ranging from Webster's[3] all-inclusive "exciting sexual desire" to the more restricted version of F. C. Appel[4], "a substance that either arouses sexual desires in another or enhances one's own sexual powers". Both of these definitions include chemical drugs, perfumes, deodorants, pornographic material, vibrators, dildos, water beds, undergarments and appealing clothes. The first also encompasses prayers, sensuous music, kissing, necking, petting, biting, scratching, talking, sumptuous dinners, tingling drinks and love.

While these methods may be effective, they accomplish their feat through deft manipulation of the five senses rather than by directly affecting the sex centre within the brain or the central cortex. It is the control of these latter two areas by chemical concoctions with which this paper is concerned.

The time-honoured purpose of aphrodisiacs was to enable the aging man to retain the sexual prowess he possessed during his adolescence[5]. Thus, the search for aphrodisiacs was concomitant with the search for the elusive fountain of youth. However, many employed the philtres as agents with which to sexually arouse their partners, either because their mate's excitement phase was too long, or because they wished to attract and maintain their partner's interest or to abet the sexual desires of a reluctant mate[6]. Modern usage, as implied above, includes treatment even for such juvenile impairments as premature ejaculation and orgasmic failure. The aims of aphrodisiac application are thus both inciteful and remedial.

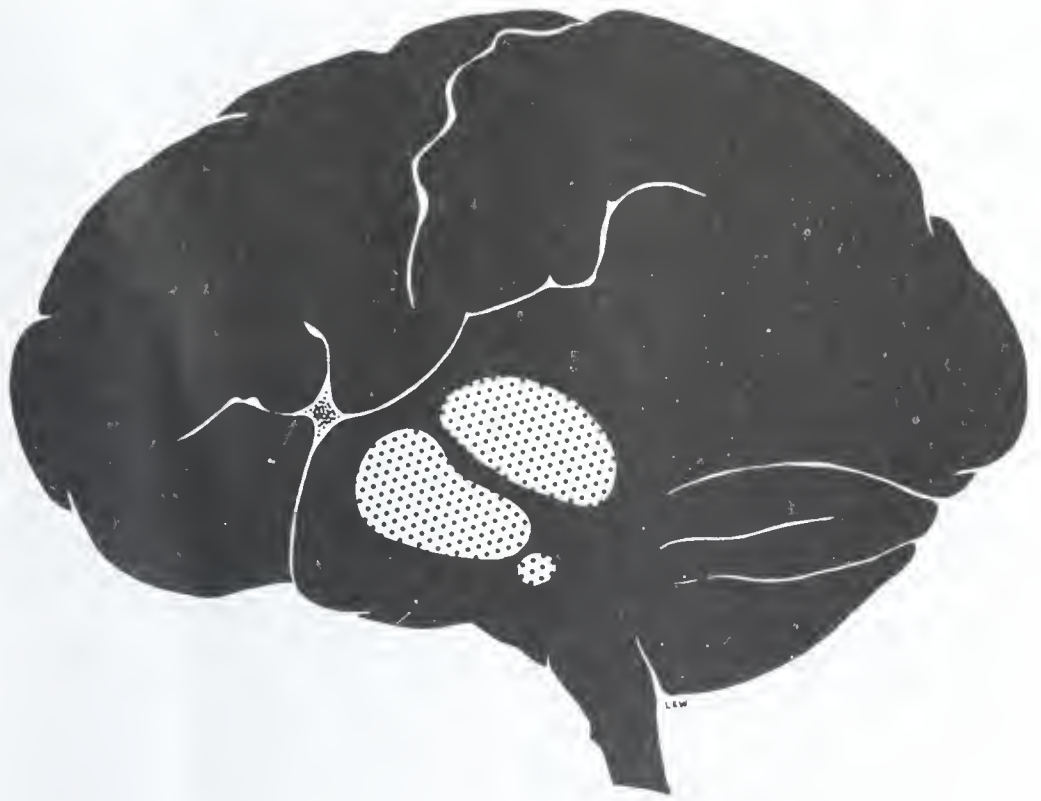
The earliest utilization of aphrodisiacs was in an Egyptian religious rite in which Osiris, god of the sun and fertility, was annointed with oil imparting defence against impotence and guarantee of amorous engagements to those who licked it. We can thus trace the history of aphrodisiacs as emerging and originating from religious rituals and supplications. The Egyptians were also the first to discover and realize the procreative stimulus of a certain beetle belonging to the Cantharis species. In classical Greece, sorcerers assumed the dispensary function for love potions which now branched into such opotherapeutical and vegetable derivative varieties as seagull anodine and satyrion root respectively. Aristotle mentions peppermint and cantharis as sex stimulants. Also popular during this period were the hippomanes. All these were prescribed both internally and externally. The Hindus recommend—as in the Kama Sutra[7]—boiled ram testes, the Hebrew tradition through the Old Testament[8] alludes to mandrake, while the Moslem literature advocates sparrow eggs.

In the Middle Ages, interest was placed in cantharides, sperm and menstrual blood as well as mandrake and rare oriental spices. The first mineral aphrodisiac, phosphorus, was realized in the 18th century by Leroy. In the 19th and early 20th centuries, kavakava, Turnera aphrodisiaca[9] and haplopapus were introduced, but it is heavily debated whether these act directly by stimulating the sex centres, or indirectly, by blocking inhibitions. In 1896, M. Spiegel isolated the Yohimbine alkaloid, a powerful stimulus in higher animals other than man. An important outcome of this period was the unequivocal condemnation of cantharis, an irritant like many of the above, which can result in priapism, turgidity and gangrene of the penis[10] if applied externally, or irritation of the kidneys and urinary tract, burning in the throat, abdominal pain, vomiting, shock and even death if taken internally[11].

Attention during the 1950s and 1960s was focused on marijuana, hashish and opium which depress the central nervous system and relax inhibitions, but have the adverse effect of simultaneously relaxing the genitalia. Hallucinogenic drugs such as LSD, MDA, and mescaline enable the individual to simulate copulation by opening new dimensions for all sensations. Amphetamines and barbituates are depressants, subverting not only inhibitions but also sensory nerves.[12] As defined by their modus operandi, the above drugs are not true aphrodisiacs.

In 1957-8 Montagu[13], Weil-Malherbe, Bone[14] and Carlsson[15] showed that dopamine occurred in the brain. Dopamine is formed in the body from the amino acid tyrosine via L-DOPA. Dopamine, as such, can be converted into active norepinephrine, which, along with its associate serotonin, is a neuro-transmitter in the limbic system, or into inactive homovanillic acid (HVA). Eighty percent of brain dopamine is located the the basal ganglia complex.[16] Anatomically, the basal ganglia are the caudate nucleus, putamen, globus pallidus, amygdaloid nucleus and claustrum. The amygdaloid nucleus is the brain's sensory sex centre.[17]

Reserpine depletes brain dopamine[18] and causes a syndrome indistinguishable from parkinsonian syndrome, but this reserpine effect can be counteracted with L-DOPA[19]. This in fact was the treatment prescribed in 1961 by Birkmayer, Hornykiewicz[20] and Barbeau[21] resulting in an improvement in akinesia and rigidity. However, Muenter[22] and Keenan[23] reported hypersexuality in a number of patients—"While most patients enjoyed this new lease on life, some were embarassed; many spouses were perplexed as to how to deal with it". Further substantiation of this side



effect came from Nakano and Tyler in 1971.[24]

Concurrent with the dopamine studies, research was continuing in the association between the serotonergic and adrenergic mechanisms in the central nervous system and the male sex hormones in controlling sex behaviour. It had been shown that p-chlorophenylalanine (PCPA), which inhibits the synthesis of 5-hydroxytryptamine (5-HT, serotonin), produces compulsive sexual activity in male animals by depressing the serotonin level in the limbic system.[25] G. L. Gessa, A. and P. Tagliamonte and B. Brodie demonstrated in 1970 that the sexual acts could be inhibited by restoring brain 5-HT levels with 5-hydroxytryptophan. On the other hand, the stimulation caused by the PCPA can be potentiated when the catecholamine levels are increased with the addition of pargyline, an inhibitor of monoamine oxidase (MAO) whose uninfluenced function is to maintain balance between the serotonin and norepinephrine levels. They further showed that PCPA effect was dependent on presence of testosterone, the male sex hormone.[26] The injection of testosterone to heighten libido, however, is not advisable as it leads to a dimunition of the testosterone produced by the testes and ultimately perpetrates atrophy of the testes.

A facile conclusion from the above work might be that the ultimate aphrodisiac consists of L-DOPA, PCPA and pargyline; the L-DOPA would increase the norepinephrine level, PCPA would suppress the serotinin effect, and the pargyline would inhibit the MAO function. This solution is ingenuous because it disregards all side effects incurred by these manipulations of a normally stable system. However, this work does exhibit a direct correlation between sexual behaviour and chemical concentrations within the brain. It is possible that sexual dysfunctions result directly from shifted chemical equilibriums, themselves induced by psychological disorders. For example, lack of orgasm could originate from increased levels of 5-HT or 5-hydroxytrptophan. The cure would then entail administration of PCPA or addition of an enzyme that would digest 5-hydroxytryptophan. Also, rather than irreversibly castrate sexual offenders[27], one could give them doses of 5-HT to reduce their drives.

Rather than search for psychological stimulants as their predecessors have done, modern scientists are studying the mechanisms of the brain and experimenting with methods to control its workings. The search for aphrodisiacs will end exactly where it began: in the brain of Homo sapiens.

Aphrodisiac Index

As compiled by this author, this index includes any relevant or available description (in brackets).

Agaris (canthartic), ageil (= provinsa = pervinca, Albertus Magnus), agate, allectorius, almonds (Hindu, Djelinouss), amergis, anchovies, androkinin, aniseed (Dioscorides), arsenic, artichoke, asa foetida, ash-keys, asini, asparagus roots.

Basil (Hollerius), bezoar stone, borage, borax.

Calamint (aromatic herb), camphor (energetic stimulant), cantharides (Egyptian, Aristotle; Lucretius died from it), carrot, castoreum (strong smell, nauseous taste), celery, ceratitis, cervi, ceti priapus, chalcedony, chervil roots, chickory, chitic extract, chocolate (solid), chrysocolla (Hindu), cinnamon (Hindu), civet (great rarity, Matthiolus, Amatus, Caesalpius), clove, corvin (Waugh & Abbott), crab, crayfish (Lord Middleton), cress seed (Petronius), cumin (umbelliferous herb, aromatic), cunnim, cygni.

Damiana (H. L. Byrd—1875), dates, datura (powerful narcotic), durian fruit (Paludamus and Linschott), dynambin, dynatin.

Echinacea augustifolia (Waugh & Abbot), elecampane, enandrol, eringoe (English, Lord Bacon, Burton, Shakespeare), eruca (Columella, Turner).

Galanga root (Theophrastus), galenicals, garnet, ginger (calorific), glandular secretions (human or animal), gossypin (Waugh & Abbot), guinseng root (Oriental).

Habbes somna, handakourka berry, hashish (Villard), haplopapus (H. L. Byrd 1875), hippomanes (Ovid, Virgil, Tibulus, Juvenal, Dioscorides), hormin.

Iris.

Jasmin.

Kava-kava (1844, principle ingredient of Polynesian drink), knosorchis (Dioscorides, drink in milk).

L-DOPA, lecithin (V. G. Vecki), leek, lettuce (eaten in German brothels), lobster, lupolin.

Mandragora (Greek), mandrake (Hebrew, Shakespeare), marijuana (= tetra hydocannabinol), marjoram, menstrual blood, mercury, mint (Apulius), muiracithin (V. G. Vecki), mullet, mushrooms, musk (Mahommed), mussels.

Nepenthes (Homer-Circe gave it to Ulyses), nettle seed (Petronius), nostrum, nutmeg, nux vomica (potent aid to debilitated lovers).

Okasa lozenge, onions (Alexis, Aristophanes), oyster (Juvenal).

Paneros (Epicurus, mineral lost to antiquity), papaverin, parsley, partridge (Cardanus), PCPA (see article), pearls of Titus, pepper, peppermint (Aristotle), pervinca, phallus (Adrianus, Matthiolus), phosphorus (Leroy), pigeons (Cardanus- it excites Venus), pills of Hercules, pistachio nuts, polypi (Mnestheus, Paul of Aegina), potatoes (Shakespeare), prayers (Egypt), prostatic ex-

tract, provinsa (Albertus Magnus), pyrethron (Greek).

Quinces.

Radish, reindeer antler, rejuven, remora bones (Roman), renandeus, repenthes, rhinoceros horn.

Saffron, saryrion (Greek, Dioscorides, Caelius Aurelius), savory, savin (Druid), saw wort, sea holly, seagull anodine (Greek), sekakul (Orient), semen (Breslauen Sammulungen, 1726), senecin (Waugh & Abbot), shark fins (Orient), shrimp (Orient), silphium (Greek, Lucian), skink (Arab, = scinc), sparrow (Arab, Ibn Al-Baiton, brain & marrow), strychnine (I. Bloch), sturgeon.

Tantokrin, testes (Hindu, ram, goat, lion), Theophrastus herb, thyme (strengthens veins while provoking coitus), tinctura capisca (W. J. Robinson), tinctura zingeberis (W. J. Robinson), tomatoes, tragordis, truffles, turtledoves (Cardanus), Turnera aphrodisica (H. L. Byrd, 1875).

Urchins (Juvenal).

Vanilla, verbena (Druids), vervain, vulpis, vulvar secretions.

Walnuts, whelk, wild hemp.

Yohimbine (Spiegel-1896).

Zedoary.

Addendum: The "L" paragraph should have included 'love'. Forgive the author, but in his enthusiasm, he omitted the most powerful stimulus.

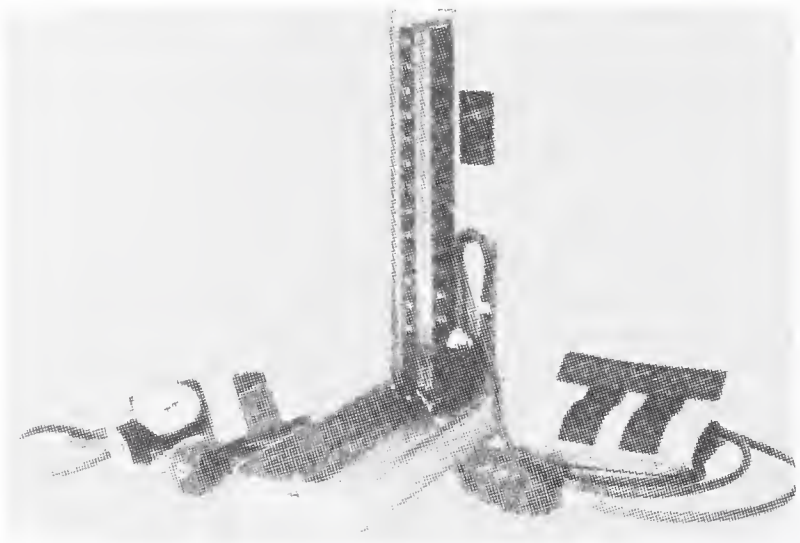
Index of Anaphrodisiacs

Angus castis (used by Vestal Virgins), alcohol (in more than moderate quantities), amethyst, artemisia, beef, beer, cheese, chocolate (liquid), coffee, meat (heavy types), milk, parthenium flower, pie crust, tea, tobacco. ■

Notes & Bibliography

1. Masters, W. H. Johnson, V. E., *Human Sexual Inadequacy*, Little, Brown & Co., 1970, p. 94.
2. *Ibid.*, p. 169
3. Webster's Seventh *New Collegiate Dictionary.*
4. Appel, F. C., "Just Slip This Into Her Drink . . . ", *Playboy*, Aug. 1970, p. 82.
5. Denninger, H. S., "A History of Substances Known as Aphrodisiacs," *Ann. Med. Hist.*, 2, 1930, p. 383.
6. Appel, *loc. cit.* 176
7. Vastayana, *Kama Sutra.*
8. Genesis XXX, 14-18.
9. Bogdanowicz, I, *Turnera Aphrodisica*, B.Sc. thesis, Phm.Lib., T B 40, 1967, p. 1.
10. Denninger, *loc. cit.* 391
11. Appel, *loc. cit.* 84
12. Campbell, R., "The Chemistry of Madness", *Life*, Nov. 26, 1971, p. 79
13. Montagu, K. A., "Catechol Compounds in Rat Tissues and in Brains of Different Animals", *Nature* 180, 1957, p. 244.
14. Weil-Malherbe, H., Bone, A. D., "Intracellular Distribution of catecholamines in the Brain", *Nature* 181, 1958, p. 1474.
15. Carlsson, A, *et al* "On the Presence of 3-hydroxytryptamine in Brain." *Science* 127, 1958, p. 471.
16. Hornykiewicz, O. D., "Physiologic, Biochemical, and Pathological Backgrounds of Levodopa and Possibilities for the Future," in O'Malley, W. E., "Pharmacologic and Clinical Experiences with Levodopa: A Symposium," *Neurology*, Vol. 20, no. 12, part 2, p. 1.
17. Guyton, A. C., *Textbook of Medical Physiology*, p. 733.
18. Carlsson, A. *et al.*, "3, 4-dihydroxphenylalanine and 5-hydroxytryptophan as Reserpine Antagonists."
19. Carlsson, A., *loc. cit.*
20. Hornykiewicz, *loc. cit.* p. 3
21. *Ibid.*
22. Muenter, M. D., "Double-Blind, Placebo-Controlled Study of Levodopa Therapy in Parkinson's Disease," *Neurology*, Vol. 20, no. 12, part 2, p. 12 (see entry 16 above)
23. Kennan, R. E., "The Eaton Collaborative Study of Levodopa Therapy in Parkinsonism: A Summary", *Neurology*Vol. 20, no. 12, part 2, p. 55 (see entry 16 above)
24. *Ibid.*, p. 55
25. Ferguson, J. *et al.*, *Psychophysiology*, 6, 221 (1969); Tagliamonte, Gessa, Brodie, *Science*, 166, 1433 (1969); Shillito, E. E., *British Journal of Pharmacology*, 38, 305, (1970)
26. In their article, they state, "Without exception the animals mounted repetitively at intervals of 1 to 5 minutes. Sometimes three to six rats were lined up and were mounting one another at the same time". These were all *normal, male* rats. They were not homosexual when not under the drug's influence.
27. This has been recommended by Billy Graham. A similar procedure is undertaken in several states with the mentally retarded or "genetically defective".

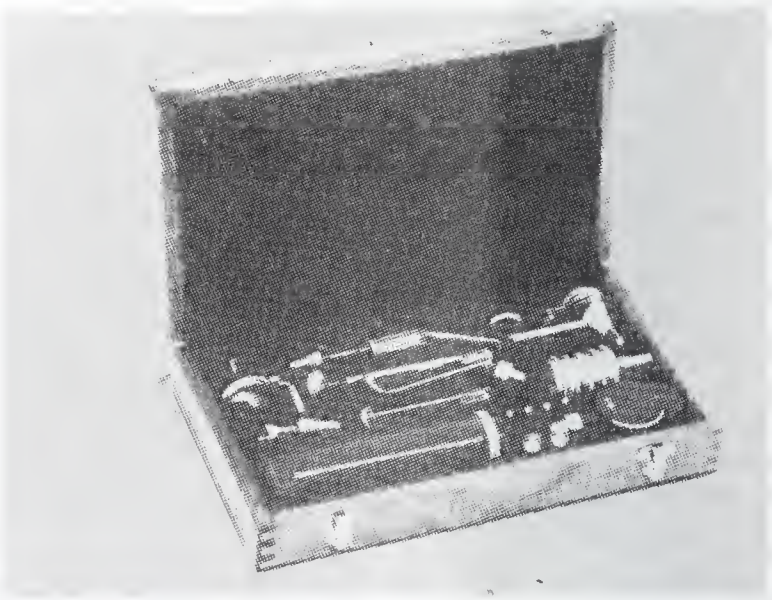
A more complete bibliography is available from the author on request.



Sphygmomanometer (Aneroid type) $25.50
The case of this model is made of iron sheet with baked black enamel finish. The dial is distinctly marked with graduations and figures in black on white background facilitating easy reading. The cover is made of durable acrylic resin plastic of 52 mm. diameter.
Sphygmomanometer (Mercurial type) $31.50
The Sphygmomanometer is housed in an aluminum case finished in baked wrinkle enamel. Four rubber studs are mounted at the bottom of the case to avoid scratching the desk surface.

Diagnostic Set for Eye, Ear, Nose & Throat. $58.50
/This Diagnostic Set is used for examination of diseases of ocular fundus, auditory meatus, rhinopharynx, mouth, larynx, etc. The set comprises the following instruments:

(1) Ophthalmoscope (2) Otoscope (3) Dilating Nasal Speculum
(4) Tongue Depressor (5) Laryngeal Mirrors (6) Battery Handle



$5.00 postage and handling Ontario resident, add 7% P.S.T.
FOR FURTHER INFORMATION ON MEDICAL EQUIPMENTS AND SUPPLIES
MANUFACTURED OF THE HIGHEST QUALITY IN THE PEOPLE'S REPUBLIC OF CHINA,
PLEASE WRITE:
PENINSULAR ENTERPRISES
2498 YONGE STREET; SUITE 5
TORONTO, ONTARIO, CANADA M4P 2H8
TEL. (416) 482-6450

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

ELECTIVE CIRCUS

Undergraduates interested in psychiatry are doing a wide variety of electives. Here are a few of them.

Clinical Application of Biofeedback

Carried out at Clinical Psychophysiology Laboratory, Veterans' Administrative Laboratory, Sepulveda (Greater Los Angeles), California and UCLA.

Biofeedback, by some called the marriage between medicine and mind, has in the last years reached a wide degree of clinical acceptance. The believers feel it can relieve migraines, back pain, epilepsy, asthma and other chronic ailments with many future applications, especially to psychosomatic medicine (which makes up a very large portion of general practice), being envisaged. It is one of the more accepted sub-classes of the "holistic medicine" approaches now evolving in North America but especially on the U.S. west coast.

The clinical psychophysiology laboratory in Sepulveda is doing much-needed basic clinical reseach on what variables being fed back to patients are actually responsible for the therapeutic effect. The researchers study migraine patients and have just started a research programme with chronic back pain patients. Using sophisticated techniques they are helping migraine patients help themselves by learning to control their own autonomic nervous systems.

I found this approach to medicine/psychiatry extremely valuable, for it satisifes the often forgotten medical criterium "Primum non nocere"—"Firstly, do no harm," as well as giving patients relief from their suffering and totally involving them in their own treatment. Once the technique is learned the machine is no longer needed yet the patient has a safe, reliable tool in his own "healing armamentarium". Much important basic research remains to be done in this field, yet it surely is a technique of the medicine of the future—today.

—Karl Maret 7T7

Child and Adolescent Psychiatry

The Thistletown Regional Centre is a community psychiatric clinic for children and adolescents in the north-western part of Toronto. It provides many psychiatric services to the residents of the community and offers a wide spectrum of treatment programs for referrals from hospitals in the neighbourhood. Our elective program lasted eight consecutive Wednesdays, with morning and afternoon sessions at different parts of the centre.

We were able to participate in many of their services in various ways. We sat in on in-patient interviews; we observed out-patient interviews and family therapy sessions (with the consent of the patients); we watched videotapes demonstrating psychiatric techniques such as play therapy and family therapy. We were also present at group therapy sessions which were used as an alternative form of communication between the child-care worker and the patient. Then, after watching or participating, we would discuss the case at length with the psychiatrist or child-care worker involved at the time.

—Debbie Hastings, 7T9
Kirby Hsu, 7T9
Edwina Yen, 7T9

Distress Centre

I work as a volunteer at the Toronto Distress Centre, which is a 24-hour phone-in "befriending centre", operating as a resource for people who feel a need for anonymous support and/or assistance. Callers range from people phoning in to say "good morning" after an overnight shift, to those who are considering suicide as a serious alternative.

I can't say I feel that Distress Centre is a "psychiatric elective", really—there are ample numbers of trained professionals for people who wish to talk to therapists or counsellors regarding emotional or legal problems. We are not attempting to compete with or replace professional helpers. Rather I feel that we are an alternative to the helping professions, offering a different kind of help and support—that of an unseen friend. This help is sometimes judgemental, sometimes not, depending on both caller and volunteer. There are no guidelines or typical responses to callers—we act and react as seems best to us, and our callers appreciate this "gut reaction" type of response.

As medical students, I sometimes feel, as Harry Whittaker says, that we're being trained to be very good plumbers, and that it's very much up to us if we do more than that. Working at the Distress Centre is my way of best expressing who I am and what I have to offer outside the label "medical student". The callers are human beings, and are treated as such—and in return, they are somehow managing to teach me a great deal about medicine and about myself.

—Anon, 7T9

Child Psychiatry

My two-month elective in child psychiatry at Sick Children's Hospital included both observation of sessions and some individual involvement with patients. Among other activities, I joined the assessment sessions of two teams under Dr. Simmons and Dr. Steinhauer, three half-days a week. These were good sessions for learning, involving both observation and discussion.

I also joined the standard teaching sessions for clerks in the pediatric rotation. A broad range of clinical material was selected for these sessions, with discussion at a level of sophistication appropriate for clerks. Joining these sessions over two months allowed exposure to several psychiatrists' clinical styles.

Where possible I also joined consults with both staff psychiatrists and residents. These included ward consults, a few sessions with Dr. Pakes at the Princess Margaret Hospital, and some mornings with Dr. Lefevre on consults to the learning clinic. One of these ward consults led to further involvement with a seven-year-old patient.

A most valuable experience was with Dr. Kligman's preschool assessment program, designed for training non-psychiatric personnel. In all, I was primarily responsible for the assessment of five patients, ranging in age from three to 14 years from both Dr. Simmons' and Dr. Steinhauer's teams. In each case, this involved relating ancillary information with direct interview material to arrive at an overall picture. This proved the most challenging aspect of this elective.

A note should be made to students wishing to take this elective in the summer time. August is a predictably slow month in the department of psychiatry, and I found the beginning of the elective at this time extremely frustrating as I tried to become involved in useful activities. It should also be noted that this elective involves a great deal of observation, with relatively little opportunity for practice of clinical skills. This is necessarily so, since this is a sub-pecialty taught at a specialized referral hospital. Other students might find more opportunity to assume real responsibility in other settings.

—Stephen Tulk, 7To

Physician Incomes

Stu Iglesias, 7T9

Shaw might be surprised to find that current public debate focuses not on the penury but on the affluence of our profession. In the *Doctor's Dilemma* he proposed that salaries for physicians replace fee-for-service on the grounds that it would free doctors from debilitating poverty. The same proposal is advanced today but now it is viewed as a mechanism for restraining doctors' incomes.

This complete reversal follows a period of rapid and sustained growth in health costs, a significant component of which is attributable to increased payments to physicians. Within the current climate of austerity, governments are quite firm in their resolve to bring these health costs under control. The proposals they advance and the subsequent responses by our profession will be critical to the future practice of medicine. The following paper reviews the evidence on physician incomes, their relation to other incomes and to overall health costs, and the factors responsible for their growth.

It examines the likely effectiveness of two policy tools by which governments can, or could, attempt to constrain both health costs and physician incomes—instituting deterrent fees and confining increments in the physicians fee schedule to relatively small increases. It concludes with the suggestion that a vigorous effort to sustain our substantial relative income gains viz-a-viz the rest of society, while being highly remunerative in the short run, might possibly prove highly injurious to the profession in the long run.

We see in Table I that the average net professional income of Canadian physicians more than doubled between 1961-71 reaching an average for Ontario of $41,363. If only those physicians with incomes of $15,000 or more are included in the sample (to isolate the earnings of full-time physicians), the average net professional income for Canadian physicians in 1971 was $42,624

> *To make matters worse, doctors are hideously poor. Better be a railway porter than an ordinary English general practitioner.*
>
> G. B. Shaw, *Preface to the Doctor's Dilemma,*

(in Ontario, $44,065). This represents a growth rate of 8.8 percent per year.

Over the same period the average income of all employees in Canada grew from $3,521 to $6,089, a growth rate of 5.6 percent (Table II). The net effect was to increase the relative income differential from 4.8/1.0 to 6.5/1.0, an increase of 35.4 percent.

Nor were these relative gains restricted only to average incomes for all Canadians. We see in Table III that physicians' incomes were growing at a rate that exceeded that of all other professional groups. Dentists managed better than other professional groups, only falling an extra 8.5 percent further behind physicians (from 1.41/1.0 to 1.53/1.0). It should be noted that these relative income gains of physicians were achieved over a period of time when the education differential between physicians and their fellow Canadians were narrowing.

TABLE I
Average net professional earnings of active fee practice physicians in Canada and Ontario, 1961-71

Year	Canada	Ontario
1961	$16,471	$17,682
1962	16,970	18,306
1963	18,689	20,492
1964	20,484	22,497
1965	22,064	24,188
1966	23,262	24,456
1967	26,093	29,354
1968	28,615	32,098
1969	30,861	33,093
1970	34,360	38,993
1971	39,203	41,363
% change 1961-71	238.0%	233.9%
per annum	8.8%	

Source: *Earnings of Physicians in Canada 1961-71*. Health care Series No. 30. Health and Welfare Canada, Ottawa.

TABLE II
Average income of all employees from all sources, Canada, 1961 and 1971

Year	Income	Physicians' Income / All others
1961	$3,521	4.8/1.0
1971	6,089	6.5/1.0
% change 61-71	73.0%	35.4%
per annum	5.6%	

Source: *Earnings of Physicians in Canada 1961-71*, ibid.

What effect have these large increases in payments to physicians had on overall health costs? Table IV shows that total expenditures on personal health grew at an average annual rate of 12.0 percent between 1953 and 1971, increasing more than sevenfold over the 19-year period. Payments to physicians grew at a slightly slower rate decreasing from a share of 25.5 percent of total personal health costs in 1953 to 24.2 percent in 1971. However in the last six years the rate of increase in payments to physicians accelerated to 14.6 percent; i.e., physicians incomes were increasing more quickly than overall health costs and were a significant factor in pulling up total health costs.

The conclusions which can be drawn from the data are: (1) payments to physicians, which represent approximately

TABLE III
Average Net Income from all sources of taxable self-employed Professionals, Canada, 1961 and 1971

	1961	1971	per annum % change
Physicians and Surgeons*	$17,006	$39,555	8.8%
Engineers and Architects	14,692	21,648	3.9
Lawyers and Notaries	15,718	27,862	5.9
Dentists	12,337	25,828	7.7
Accountants	11,627	18,631	4.8

*Figures differ slightly from Table I since they include non-professional earnings.
Source: *Earnings of Physicians in Canada 1961-71*, ibid.

25 percent of total health costs, are an important contributor to rising health costs; (2) there must be other components of health costs that were increasing more rapidly[1] for the years prior to 1965; and (3) the contribution of payments to physicians to increasing health costs has itself grown larger since 1965. Thus it seems difficult to fault a government which turns to physicians' incomes (and physician stock) in an attempt to control health costs, although we would hope that they will show an equally firm resolve to controlling other cost factors as well.

Factors Affecting Physician Incomes

Physician incomes can increase for two reasons—the *price* of their services might increase or the *volume* of their services might increase.

We see in Table V that it would be difficult to explain more than a portion of the 11.4 percent annual increase in payments to physicians by increases in their fee schedule. Over the period 1957-71 list prices rose by only 3.1 percent per year which is almost identical to the rise in the Consumer Price Index. However, it is probable that increases in list prices do not capture the full price increase over this period. Prior to the advent of private, and then public, health insurance, doctors had an 'actual' fee schedule that was somewhat lower than 'list' prices and which was usually adjusted to a patient's ability to pay. Insurance had the effect of raising actual prices to list prices for all patients[2]. U.S. survey data indicate that the ratio of actual to list prices was about two-thirds in 1963[3]. If this figure is comparable to Canadian data then list price increases will seriously underestimate the true price increase for physicians' services.

A second problem with the data on price increases is that they assume that the mix of services provided by physicians did not change over the time period. To the extent that physicians change this service mix (i.e. do more or less of high-priced services), the data might over- or underestimate the true price effect. One change which most researchers attempt to identify is the increasing specialist/general practitioner ratio over this time period. It can be argued that price increases attributable to increased specialization of the profession are simply a payment for an increased quality of service.

After adjusting the price data for the above qualifications, the income increases which are left unexplained can only be attributed to increased servicing, i.e. the physicians produce an increased volume of services. The smaller you believe the price effect to be, the larger must be the effect of increased volume of services on physician incomes.

Taking all these factors together, R. Evans, in an early study using only 1957-69 data, estimated that the increase in physicians' incomes could be attributed as follows[4]:

TABLE IV
Expenditure on Personal Health Care in Canada 1953-71 ($Million)

Year	Total Cost	Payments to Physicians*
1953	$689.9	$176.6
1954	753.9	753.9
1955	814.6	206.5
1956	923.2	240.1
1957	1047.4	271.3
1958	1144.9	301.3
1959	1290.5	325.7
1960	1442.2	355.0
1961	1589.9	388.3
1962	1726.2	406.1
1963	1922.0	453.4
1964	2122.3	495.7
1965	2378.6	545.1
1966	2682.3	605.2
1967	3055.1	686.2
1968	3517.5	788.1
1969	3960.9	901.4
1970	4477.5	1028.9
1971	5109.5	1236.2
per annum % change		
53-71	12.0%	11.4%
65-71	13.6%	14.6%

*These data are not strictly comparable to those of Table I as they reflect a significant increase in the *number* of physicians as well as increased incomes. Over the period the number of physicians per 100,000 population rose from 78.0 to100.4, a 1.8 per cent per annum increase.
Source: R. Evans "Beyond the Medical Marketplace & Expenditure, Utilization and Pricing of Insured Health in Canada", in *Natural Health Insurance: Can We Learn From Canada?* S. Andreopoulous, ed., John Wiley & Sons, N.Y., 1975.

TABLE V
Physician "Price" Movements in Canada, 1957-73 (1961 = 100)

	Physicians Services (List Price)*	Consumer Price Index	Expenditures as Physicians Services**
1957	89.5	94.4	70.0
1958	94.4	96.8	77.6
1959	97.1	97.9	83.9
1960	98.4	99.1	91.4
1961	100.0	100.0	100.0
1962	103.0	101.2	104.6
1963	104.9	102.9	116.8
1964	107.1	104.8	127.6
1965	110.3	107.4	140.4
1966	112.2	111.4	155.9
1967	121.4	115.3	176.7
1968	127.9	120.1	203.0
1969	134.8	125.5	232.1
1970	137.0	129.7	265.0
1971	139.6	133.4	318.4
1972	142.3	139.8	——
1973	145.7	150.4	——
% change			
57-73	62.8%	59.3%	——
57-71	——	——	359.9%
per annum	3.1%	3.0%	11.4%

*Value of the C.P.I. physicians' fees components, 1957-64, and linked in 1965 to N.H. W. Fee Benefit Index.
**Data taken from Table IV and indexed using 1961 = 100.
Source: R. Evans, "Beyond the Medical Marketplace" ibid.

Increase in list prices 43%
Increase in specialization 6%
Increase in actual/list prices 10-20%
Increase in servicing 29-18%

The price factors do not require complicated analysis. During the time period the medical profession was free to set prices by its own criteria and seems to have used that power to increase list prices at a rate comparable to the overall level of prices. The increase of actual to list prices, if it was important, was a windfall that accompanied the introduction of universal health insurance.

However, the servicing effect is more interesting. The prevalent belief is that this is the result of an increased demand for medical services by the public who, since public health insurance, perceive these as 'free' services. The evidence is quite interesting and it is to this and related matters which we now turn our attention.

Demand

An increase in demand by the public for physician services could explain the increase in utilization figures. This might operate in one of three ways. (1) There could be a shift in the need for medical care—for example, a growing proportion of people over 65. (2) There could be a shift in our preferences for medical care—for example, a rising per capita income could be accompanied by a willingness to devote more resources to our personal health care. (3) If the demand for medical care were very sensitive to price, then 'free' medical service induced by private and public health insurance could lead to increased demand.

The evidence, however, does not provide convincing support for any of these hypotheses. First, demographic data show that those sectors of the population which are high users of medical care—over 65, under 5, and pregnant women—have either remained static or decreased in proportion to total population over the relevant time period[5]. Second, econometric data have shown that dental services are much more sensitive to a rising per capita income than are medical services[6]. However the increases in expenditure on dental services were considerably lower than the increases for medical services[7]. Third, those researchers who have attempted to measure the effects of health insurance on increased patient demand for services have come up with surprising results.

The key study is a before-and-after Medicare study on physician utilization in Montreal[8]. Some of the results are worth citing:

- Physician visits per person per year remained constant at about 5 but were markedly shifted from persons in higher to lower income groups.
- There was a reduction of 8½ hours in the physicians' average work week (from 54.8 to 46.3 hours).
- Persons in lower income groups more frequently reported symptoms that were relatively common and for which medical care would be important than persons in higher income groups and, moreover, before Medicare were less likely to have sought medical care for these symptoms. Thus increased use of physician services by lower income groups was not due simply to trivial complaints.

Thus we see a substitution of patient load from upper to lower income classes with a *reduction* in total physician workload (as measured in hours worked per week). Intuitively it would seem that, to the extent that some people are price-sensitive in their demand for medical care, they are concentrated in the lower income groups. Patients in higher income groups were likely deterred from presenting minor complaints by large increases in waiting time which accompanied Medicare. The evidence that more serious complaints were being substituted for less serious complaints points to an overall improvement in health status. The most likely explanation for the decline in physician workload is that physicians chose to take some of the potential income gains that accompanied Medicare in the form of leisure rather than remuneration.

The most serious difficulty with a patient-demand theory of increased servicing is that, if true, it would provide a once-and-for-all income jump when insurance was introduced. However, the data, as we shall see shortly, present a picture of *continually* increasing payments to physicians, something which no patient-demand hypothesis can explain.

Supply

An alternative explanation of servicing increases is that they are not patient-generated but physician-generated. This view is derived from a recognition of one of the fundamental characteristics of the medical profession—the agency relationship between doctor and patient. When a patient comes to a physician with a problem there is a recognition by both parties that a considerable information differential exists between them. The patient is simply not knowledgeable about his problem, its possible consequences and its potential for treatment. He is simply not in a position to discriminate among the various services and repeat visits prescribed for him by his physician. He must depend on the physician to act in the patients' best interests. It is this agency relationship which makes the medical market place unlike most other marketplaces.

One of the consequences of the agency relationship is that the medical practitioner is at the same time supplier and prescriber of his own services. This affords him a potential to control his own income to a degree unparalleled in other markets.

Consider the options open to the physician for controlling his income via the volume of services he offers: he might increase the number of patient contacts by recalling patients more often for follow-up visits; he might increase the number of services (e.g. diagnostic lab tests) per patient; he might do both the above by increasing his work week or by increasing the rate at which he sees patients; he might change the mix of services he provides (e.g. doing more well-baby care and less individual psychotherapy). There are several constraints of course, and the most effective one is ethical—the agency relationship requires that he act in the patients' best interests. Historically this has provided both a price constraint and a servicing constraint; i.e., physicians adjusted prices to the patients' ability to pay and would be sensitive to the patients' financial situation when prescribing a volume of services.

Consider for a moment however the effect on these constraints of introducing third-party health insurance. No longer is there any effective price constraint. The physician is free to charge as high a price as he can persuade the insurance program to pay. There is still an effective ethical constraint on the volume of services prescribed but it has shifted outwards dramatically. Before insurance the physician was constrained not to burden the patient unnecessarily with a large volume of expensive medical care; he is now obligated simply to not prescribe any service which might have an adverse effect on the patient's medical condition. Anything which might help and cannot hurt can be prescribed without ethical repercussions. Consequently it is argued that the large increases in physician servicing levels during the period when private and public health insurance was introduced were physician-generated and not patient-generated.

This view has received considerable support in the literature. For example, studies have shown no correlation between physician density and physician

(Continued on page 14)

The Student Aid Committee of the University of Toronto Medical Alumni Association has a budget of $40,000 for 1976-77. This money is to be spent as follows:-

Scholarships (3 year scholarships of $250 each, and a graduation scholarship of $600)	$1,350.00
Undergraduate bursaries (This bursary money is awarded through the Faculty Undergraduate Awards Committee)	6,000.00
Graduate bursaries	1,000.00
Medical Student Summer Fellowships (12 Fellowships at $1,500. 6 of these are for Family Practice)	18,000.00
Medical Student Transportation Fund (This fund is primarily intended for Medical student electives, although applications for travel connected with a work experience are also accepted. The maximum individual grant is $150. Applications for 1977-78 are accepted up to April 15, 1977 for the period June 6, 1977 to November 20, 1977, and up to September 30, 1977 for the period November 21, 1977 to May 8, 1978. $3,000 is budgeted for each of the two periods.)	6,000.00
Fund for Educational Activities	1,000.00
Not yet assigned	6,650.00

There are three additional Alumni Association scholarship awards. The *Samuel J. Streight, O.B.E., M.D., Scholarship in Internal Medicine* (value $300) is awarded annually to a student in the final year who has high standing in Internal Medicine. The *Dr. R. E. Haist Award in Physiology* (value $100) is awarded annually to a second year student who has achieved high standing in Physiology. The *Dr. K. J. R. Wightman Award in Internal Medicine* (value $100) is awarded annually to a final year student who has achieved high standing in Internal Medicine.

The Association administers two special funds. The *Dr. Bernard A. Manace Award* (value $150) provides assistance to a Medical student from any year who is undertaking an elective or summer Medical experience in Israel. Preference is given to a student working in the area of Immunology or Allergy. Consideration is given to academic standing. The *Dr. L. Nelles Silverthorne Award* (value $175) provides assistance to a Medical student from any year who is undertaking an elective or summer Medical experience in a remote area. Preference is given to a student working in a mission hospital. Consideration if given to financial need. The deadline for applications for these two awards is March 1, 1977 for the subsequent 12 month period.

The Association has four loan funds. The *Medical Alumni Association Undergraduate Loan Fund* provides short term interest free loans to Medical students who require financial assistance during periods of temporary difficulty. The *Robert Elgin Towle Loan Fund* provides interest free loan assistance to women undergraduates. The *Medical Alumni Association Graduate Loan Fund (including the Emma Bissell and Agnes E. Hamshaw Funds)* provides interest free loans of up to $1,500 per year to physicians taking postgraduate training. The *Alexander and Martha Dalrymple Loan Fund in Psychiatry* provides interest free loans for physicians taking postgraduate training in Psychiatry. This fund is administered jointly by the Association and the University Department of Psychiatry.

Further information about any of the above, and application forms where required, can be obtained from Mrs. N. S. Shenstone, Secretary, Medical Alumni Association.

Incomes *(Continued from page 12)*

workload in either time series or cross-section data.[9] If servicing increases were determined by patient demand one would expect to see a thinning-out of patient load as an area became more populated with physicians. No thinning-out implies either that the patient demand is so much greater than physician supply that physician increases have no perceptible effect, or that physicians are able to generate a servicing level to meet their own requirements. To argue in support of the former obliges one also to argue that in British Columbia, where physician density is, on the average, 30 percent greater than the national average (and much higher in Vancouver itself) physicians are much more accessible than they are in other parts of Canada, including Ontario. A logical corollary would be that residents of B.C. are now healthier (because of physician accessibility) than residents of other provinces, or that they started from a much poorer health status. There is, of course, little reason to believe that in B.C. people are any more or less healthy than anywhere else in the country.

In addition, recent studies of physician behaviour in Ontario under OHIP have supported the hypothesis that, for many of the services which are under the discretionary control of physicians, the variance in the servicing levels of individual physicians is better explained by characteristics of the physician than by patient or community-based characteristics.[10]

I should make it clear that the above model does not attribute to the medical profession any perverse motivation to supply unnecessary medical care to the public. Rather, there is some evidence that physicians believe more primary care is needed.[11] A physician locating in an area with a high physician density will likely view the situation as a welcome opportunity to see his patients more often and to do more for them. He will use such 'free' services as hospitals and labs to increase the rate[12] at which he can treat his patients simply because it affords him an opportunity to do more for them.

Where the critics do make their point however is that this is a process which is enormously expensive and almost completely unconstrained on the cost side. Most public policy makers do not doubt that the increases in volume of services provided by the medical profession do improve health.[13] The important questions are 'by how much' and 'at what cost'. For example, how much healthier are the people of British Columbia with their higher physician density than are the people of Ontario? Health is also improved by better education, safer transportation, cleaner environment, reduced poverty, etc. Increasing medical costs means that sacrifices in these other areas are being made. Policy makers are faced with difficult decisions. It is for this reason that researchers have been anxious to identify the sources of escalating health costs.

The Present Situation

The data already presented are now five years old. Some have argued that the situation has changed. In particular, it is suggested that the combination of high rates of inflation and lower rates of fee increases have imposed real income losses on physicians. Between 1972 and 1975 the fee schedule for Ontario doctors rose 7.75 percent in May 1974 and 4.0 percent in May 1975, a total increase of 12.1 percent. Over the same period the Consumer Price Index increased 32.1 percent (see Table VI). Some have concluded that doctors must have suffered a loss in real income.

However, as we saw in the earlier data, physicians increase their income by both price *and* servicing changes. Indeed, given the oft-stated position of the Ontario Medical Association that doctors' incomes have been constrained by the fee schedule, we would expect to find servicing changes—either an increased level of services or a different mix of services which would yield a higher average price per service, or both. Thus it would be hasty to draw conclusions about recent income changes using only price data.

The data required to make a conclusion about recent income movements are not available. What are required are figures on the net earnings of full-time physicians. This requires tax data which simply does not come out very quickly. However figures are available which shed some light on the issue although they do not give definitive answers. OHIP has produced monthly reports on gross incomes of all physicians (full time and part-time) since April, 1972. Although these reports are not published, I have included the relevant data from them in Table VI.

Between 1972 and 1975, although the fee schedule rose by only 12.1 percent physician incomes rose by 21.8 percent, from $49,673 to $60,552. When combined with a 15.3 percent increase in the number of practicing physicians, total payments to physicians increased by 41 percent. This represents an average annual rate of growth of 12.0 percent—a figure remarkably similar to those calculated for earlier periods. When adjustments to physicians incomes are made to take into account the effects of inflation, it is clear that although physicians were able to increase their servicing levels by 8.65 percent over the period, it was not sufficient to compensate for inflation. In constant dollars incomes fell from $49,673 in 1972 to $43,735 in 1975, a decrease of 6.95 percent. These latter figures should be interpreted with caution as they are extremely sensitive to the base year

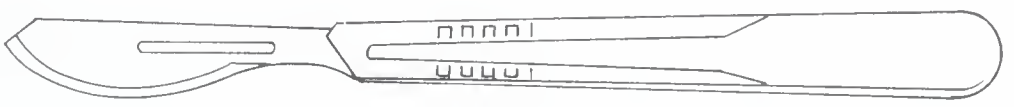
(Continued on page 20)

TABLE VI—Gross incomes of full-time physicians, 1972-1975

Year	Payment to all Physicians		Consumer Price Index*		Supply of Physicians		Payment per Physician (Current $)		Payment per Physician (Constant $***)	
	$000	% Change	Yearly Avg.	% Change	Yearly Avg.	% Change	$	% Change	$	% Change
1972	$479,516**		104.8	4.8%	9679**		$49,673**		$47,000**	
1973	514,369	7.27%	112.7	7.54	10,203	5.41%	50,330	1.32%	44,708	-4.88%
1974	590,728	14.85	125.0	11.0	10,705	4.92	55,267	9.81	44,261	-1.00
1975	675,530	14.36	138.5	11.0	11,159	4.24	60,522	9.51	43,735	-1.00

*1971 = 100
**1972 estimated using data from nine months
*** current $ divided by CPI (1971 = 100)
Source:Ministry of Health, unpublished data; Consumer Price Index, Statistics Canada, 62-001, Vol. 54, No. 9.

blunt dissection



"The best lack all conviction, while the worst
Are full of passionate intensity."

W. B. Yeats The Second Coming

The future, as envisioned by Yeats, has not yet been born. Conviction, in its lack or in its excess, is thankfully not yet a measure of the goodness of man. As such, convictions are what Blunt Dissection is all about. We propose to present issues which concern us all through the medium of, not quite a debate, but rather, a candid look at two poles of a common axis of opinion.

Why? Certainly not to persuade! Rather, to enlighten (if we may be so bold). Not only in our role as medicos, but out of our roles, as fellow pilgrims, we are *constantly called upon to make vital decisions which must, in the end, rest upon attitudes, beliefs, and opinions. And, while enlightenment can often make ticklish a decision that in ignorance is easy, it does indeed add a dash of validity to our subsequent conclusion. It is for this reason that we hope to 'tickle' you with these dissections—dissections blunt as propriety allows.*

VIVISECTION: is it worth it?

Vivisection Pro

The opponents of animal research advance various arguments to support their position, but the contention that animal experimentation is valueless or of little value is one of the most common. If one accepts our society's conviction that alleviation of suffering and the prolongation and improvement of the quality of life are desirable ends, it is difficult to agree with such a contention.

The tremendous advances in medicine in the last fifty years —insulin, antibiotics, organ transplants, limb prostheses, open-heart surgery, polio and measles vaccines, safer anesthetics, vitamins—all depend on animal research and are some measure of its value. Studies in mammalian genetics in mice have opened wide the door to knowledge of inherited disease; discovery of the "slow" viruses has opened a fruitful approach to many of the once mysterious chronic degenerative neurological diseases. It is difficult to visualize how such studies could be carried on without animals.

The logic of opponents to animal research is peculiar in that practically all avail themselves of chemotherapeutic agents when ill, have little fear of injesting carcinogens in their food, hope they will not end their days with untreatable cancer, and use cosmetics without worrying about possible toxic effects.

In an attempt to rationalize opposition to animal use with the obvious need to establish the efficacy and safety of the multitude of compounds and procedures we encounter in our modern society, opponents of animal research propose substitution of cell cultures or computers for animals. Apparently unaware of the extent of cell culture utilization, and obviously unaware of the difficulties in extrapolating cell culture results to the whole integrated organism, cell culture is held up as the golden hope of medical research which will eliminate the need for animals.

Even more naive are the proponents of computer substitu-

Vivisection Con

No morally defensible position exists by which the value of life of any being human or non-human can be judged to be of more importance than the life of any other being.

With this is mind, we intend to demonstrate that animals are entitled to rights, especially the right to life, and that their interests deserve serious consideration when humans contemplate subjecting them to suffering and/or death in order to meet human objectives. Furthermore, while the termination of all bio-medical animal research as a concomitant is not a necessarily realized conclusion, it will be clearly established that such customs as the use of animals for demonstration and teaching purposes in medical schools is unequivocally wrong.

(Pro *and* **Con** *continued on page 21)*

Future topics of Blunt Dissection:

Are 'gifts' from drug companies bribes?

Putting doctors on salary will result in better health care for the average Canadian.

Cigarette smokers should be taxed to pay for all the health and research efforts their habit generates.

Research money would be better spent in educating the public and providing more recreational facilities, etc. for everybody's use.

Statements of roughly 400 words may be submitted at anytime to the editors, or left in the Journal Mailbox in the Medical Society Office. Because we hope you'll evaluate the convictions expressed herein, and not the people who write them, we are willing to print positions and keep the author's name confidential, if such anonymity is requested.

Crohn's Disease

Peter Dobson, 7T9

Crohn's disease, an extremely puzzling and variable enteritis, has a history of investigation almost as cobbled as its characteristic lesions. Initially patients usually report right lower quadrant pain, weight loss, low-grade fever, recurrent diarrhea and lassitude. In some cases the onset is sudden and resembles that of acute appendicitis. The disease has a predilection for the distal ileum, but can occur anywhere along the gastrointestinal tract, often in discontinuous lesions.

The affected segment of bowel is edematous and stenosed. The mucosa is often ulcerated with a characteristic "cobblestone" appearance. Microscopic examination reveals transmural inflammation, fissuring and usually sarcoid-like granulomas. Common complications include small bowel obstruction, fistula, blood loss, and even perforation. Most Crohn's disease patients have an anal lesion at some stage in their illness.

Crohn's disease is more common in northwestern Europe and North America; less common in South America, southeast Asia, Australia, and Africa. It is more frequently found in Jews than non-Jews, and in caucasians than blacks. Where it is more common, the disease has an incidence of about 2/100,000 population per year and a prevalence of roughly 30/100,000 population.

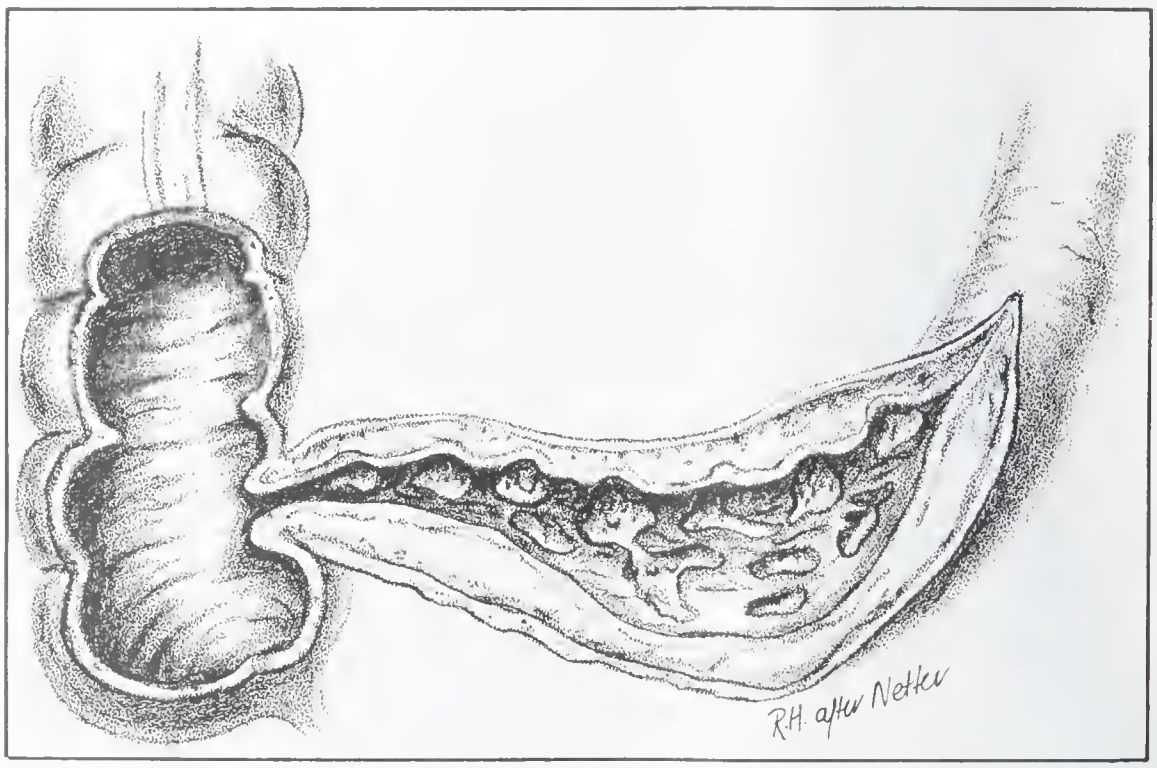
Early Models

In 1932 Crohn, Ginzburg and Oppenheimer first described 14 cases of a disease of the terminal ileum affecting mainly young adults, characterized by an acute and necrotizing inflammation, which they proposed to call regional ileitis. The disease process involved ulceration of the mucosa with disproportionate connective tissue reaction leading to stenosis of the lumen of the intestine and formation of multiple fistulae. Their description of this entity soon came into widespread acceptance and many more cases were reported. The name "regional enteritis" came into use only with the discovery that the disease was not restricted to the ileum, but occurred elsewhere in the gastrointestinal tract.

The earliest recorded report suggestive of regional enteritis was by Morgagni in 1769. In 1813, an account of a case of thickening and stricture of the terminal ileum was published. It seems that before the introduction of the microscope early in the 19th century, regional enteritis was confused with tuberculosis owing to the presence of lesions resembling tubercules. The increased use of bacteriologic studies as the basis for the diagnosis of tuberculosis led to the gradual emergence of regional enteritis as a distinct entity.

In the early part of this century the condition we now recognize as regional enteritis, or Crohn's disease, was enumerated with a general group of bowel diseases spoken of as "benign granuloma".

After 44 years of investigation, the etiology of Crohn's disease remains unknown. All attempts at bacterial isolation through tissue culture of animal inoculation have proven negative, nor have fungi been observed. Bockus and Lee suggested some peculiarity of the anatomy of the terminal ileum might predispose it to this disease, and discussed a possible vascular mechanism. Bell was unable to produce any lesions simulating this condition by interfering with the blood supply to the intestinal tract in animals. His suggestion was that the etiological factor could be an infection starting in the lymphatics as a lymphangitis and extending to the wall of the bowel or an infection in the mucosa spreading to the intestinal wall with edema of the mesentary from inadequate lymphatic drainage. Bell also noted that stenosis of the intestine sometimes resulted from a blow to the abdomen. Some authors have reported cases of Crohn's disease following severe abdominal trauma, while others have suggested primary appendiceal disease as the etiological agent since one half of their pateints had previous appendectomies. There has been a



The characteristic lesions of Crohn's disease appear most often in the terminal ileum. Edema, stenosis, fissuring and sarcoid-like granulomas are common.

suggestion that Crohn's disease, ulcerative colitis, acute bacillary dysentery and chronic non-specific granuloma are but different stages of the same disease, and that any inflammatory mucosal disease in the terminal ileum might in the end resemble the entity under discussion.

Reichert and Mothes speculated that the edema of the bowel wall and engorgement of lymphatics observed in Crohn's disease could be the result of chronic lymphatic obstruction. Obliteration of the intestinal lymphatics of dogs through injection of the lymphatics with irritating and sclerosing materials, produced chronic thickening and adhesions of the bowel. No granulomatous changes were observed, making the resemblance between these lesions and those of Crohn's disease somewhat controversial.

Lichtman *et al.* while observing that talc from surgical gloves produced granuloma in the intestine, discovered that injection of a talc suspension would produce granulomatous changes in the bowel of dogs at the site of application. They were unable to produce any lesions resembling Crohn's disease by feeding rats talc in their ration. However, most rats sustained some injury in the terminal ileum, possibly due to mechanical effects. Lichtman *et al.* suggested that some foreign bodies, while producing a minor reaction themselves, tended to sustain the inflammatory response to infection for long periods despite the subsidence of the infection. In some cases an initial event such as acute dysentery of bacterial or viral origin with ulceration of the small intestine plus the addition of a foreign body could lend to a progressive enteritis.

Chess *et al.* postulated that the intestinal lymphatics could absorb particulate material. This applied especially to the terminal ileum where lymphatic drainage is rich and intestinal contents may be delayed proximal to the ileocaecal valve. These authors demonstrated thickening of the intestinal wall and narrowing of the lumen through feeding dogs finely divided sand or talcum powder in their diet. Lymphoid hyperplasia was the main pathological finding, but no inflammation or granuloma were found in the bowel wall. Speculation continues concerning the role of ingested particulate matter in the etiology of Crohn's disease. Edwards has suggested that eating toothpaste in great quantity might have a role in the causation of the luminal disease.

Immunological Models

Current concepts of immunological involvement in Crohn's disease include: a) an autoimmune response, b) allergic reactions to exogenous antigen, c) an abnormal response to an infective agent, which is either a true pathogen or a normal inhabitant of the gut.

Antibody to reticulin has been reported in the serum of 25 percent of patients with Crohn's disease as compared to a negligible number of other gastrointestinal disorders and healthy controls. This may be a true autoantibody or only a response to reticulin absorbed in the diet. Reports of dietary antibodies in Crohn's disease vary. It is interesting to note that IgA deficiency has been reported in the involved bowel of Crohn's disease patients and patients with serum IgA deficiency are known to have an increased incidence of autoimmune disease. However, autoantibodies are generally unusual in Crohn's disease, serum immunoglobulin levels are generally normal, and associations reported between putative autoimmune disease and Crohn's disease are rare.

Immediate hypersensitivity is associated with circulating antibody. The Arthus reaction is a type of immediate hypersensitivity involving antigen reaction with precipitating antibody. Tissue injury occurs at the site of antigen innoculation following repeated administration of the antigen and is initiated by the formation of antigen-antibody complexes. Immune complexes may cause granuloma formation and have been reported in about 30 percent of patients with Crohn's disease. The Arthus reaction, with granuloma formation, has been produced experimentally by injection of egg albumin into the colon of sensitized rabbits. However, this reaction probably involves some delayed hypersensitivity due to the repeated challenge of antigen. It is this latter phenomenon which has been more intensively investigated as an immunological model for Crohn's disease.

Delayed hypersensitivity is an expression of cell-mediated or cellular immunity. Antibodies cannot be demonstrated and immunity can be transferred by sensitized leucocytes. Cell-mediated immunity in Crohn's disease has been assessed by skin testing, in vitro lymphocyte transformation and migration inhibition and cytoxicity techniques.

A state of anergy has been postulated in Crohn's disease after reports of diminished tuberculin sensitivity; more recent testing has not supported this concept. Delayed hypersensitivity has been found to be normal using other skin test antigens. However, the possibility of anergy and Kviem responsiveness suggest a link between sarcoidosis and Crohn's disease.

Out of 15 *in vitro* investigations of the response to phytohaemagglutinin (PHA) in Crohn's disease, nine found normal and five, reduced transformations of lymphocytes into blast cells. Normal variability, drugs and recent surgery influence the PHA response. There are several possible explanations for a depressed PHA response. Prolonged malabsorption and malnutrition in some patients with the disease could impair PHA responsiveness. Since PHA is a T-lymphocyte mitogen, the depressed PHA responsiveness may be the result of decreased numbers of T-lymphocytes. Strickland *et al.* reported depressed T-lymphocyte proportions in Crohn's disease, but their findings have not been confirmed. Finally, there may be a genuine depression of cell-mediated immunity.

Skinner and Whitehead say a combination of morphological features of the lymph nodes of Crohn's disease patients indicates a competence of both cellular and humoral mechanisms.

In the macrophage migration inhibition (MMI) test, good correlation exists between *in vitro* positivity and the presence in the cell donor of cell-mediated immune states. Bendixen failed to demonstrate inhibition with Crohn's colonic, jejunal and ileal tissues, but Richens *et al.* reported inhibition with Crohn's colonic extract. Dykes found inhibition in Crohn's patients with a crude faecal extract, and subsequently inhibition has been shown with the common antigen of Kunin—a component of *E. coli* 014. However, Hunt and Trotter reported no evidence of lymphocyte sensitivity to autologous rectal epithelial cells or increased leucocyte formation to faecal antigen.

Leucocytes from patients with Crohn's disease are cytotoxic for human colon cells in vitro. This cytotoxic effect is inhibited by horse anti-human thymus serum. It is possible to induce cytotoxicity in normal human lymphocytes by preliminary incubation of the latter with an extract of *E. coli* 0119:B14, suggesting that *E. coli* and colonic mucosa share common antigenic determinants. Similar cytotoxicity is induced by incubating normal lymphocytes with sera from patients with Crohn's disease.

Evidence for a Transmissible Agent

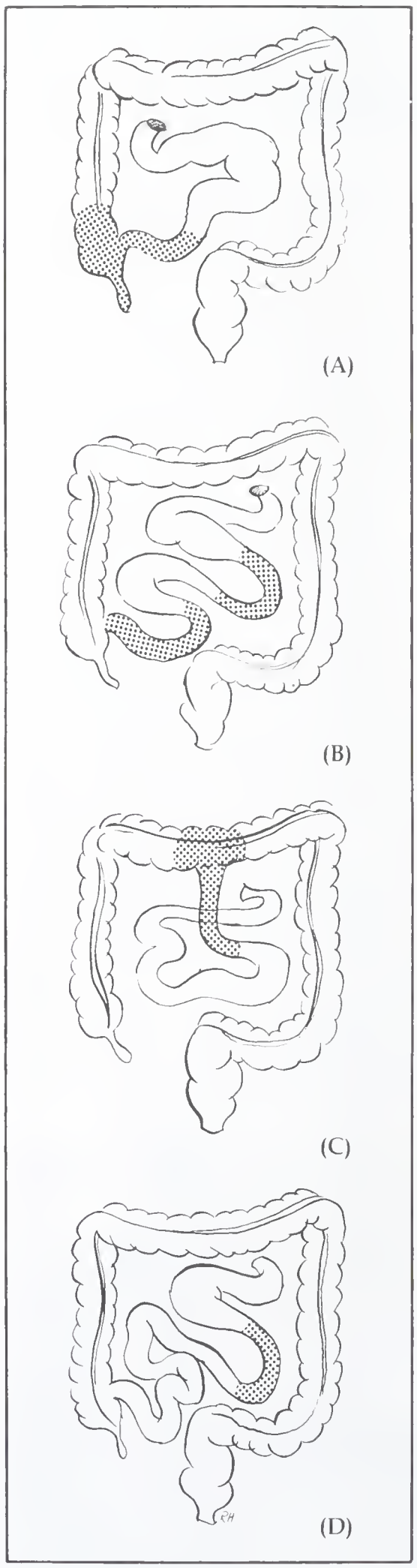
In 1970 Mitchell and Rees reported the results of a controlled study providing evidence for a transmissible agent from Crohn's disease tissue. They prepared a homogenate from ileum and mesenteric lymph node tissue from a Crohn's disease patient. Control homogenates were prepared from several lymph nodes from five non-Crohn's

patients. The experiment was modelled on the mouse (CBA strain), using the hind footpads as inoculation sites in both normal and immunologically deficient animals (thymectomy at six weeks plus whole body irradiation). The essential feature of a positive response was taken to be the presence of one or more granulomas composed principally of epithelioid cells with occasional Langerhans-type giant cells. A negative response included non-specific inflammation, foreign-body reaction, scarring, and normal tissue. Closely similar results were obtained in the normal and immunologically depressed animals, and are therefore summarized cumulatively.

Four to eight weeks post-inoculation, five out of eight footpads injected with Crohn's tissue homogenate showed granulomas, as compared to similar changes in only one footpad from 58 mice injected with the control homogenate. Between 24 and 125 weeks, eight out of 24 mice had footpad granulomas. Moreover, two of these mice had granulomatous changes in the wall of the terminal ileum. None of the 48 surviving control mice showed any significant pathological lesion. Early inflammatory reactions observed in a proportion of footpads of mice innoculated with the control homogenate could no longer be seen in the late examination. The following year, Mitchell and Rees reported a successful first pass. Homogenates of footpads, shown histologically to contain granulomas, were injected into the footpads of a further group of mice. Twenty-one to 52 weeks after passage granulomas were found in a significant proportion of normal and immunologically deficient mice. None of the controls had significant lesions.

In 1972 Taub and Siltzbach, using similar techniques, produced granulomas in five out of 16 mice, one to eight months post-inoculation with Crohn's ileum and lymph-node tissue from two patients. Bolton *et al.* were unable to confirm these results. Homogenates, fresh and sterilized, of diseased and normal bowel from seven patients with Crohn's disease were inoculated into rats, guinea pigs and TO strain mice. Some of the animals were immunosuppressed by juvenile thymectomy plus antilymphocyte serum and others by cyclophosphamide. Histological examination was at 6-9 or 24-32 weeks post-inoculation and post mortem; 295 animals were examined. No granuloma was found on any biopsy.

In 1975 this group extended their study to include a variety of conditions which might be expected to demonstrate a transmissible agent. Crohn's tissue homogenates from eight additional patients, all exhibiting granulomas histologically, were injected into the ileums of TO strain mice, rats and NZW rabbits and the lumen of the gastrointestinal tract of rats. Inoculations were also made into the footpads and ileums of rats following surgical interruption of the draining lymphatic pathways. Three non-Crohn's disease patients provided the control material. Biopsies were taken at intervals up to 65 weeks.



Crohn's disease may also be seen (A) involving the cecum, (B) in skip lesions, (C) at an ileocolostomy, (D) in the upper ileum or jejunum. (Footpad lesions occur in mice.)

No granulomas were found at any time in any biopsy in 91 animals. In a total of three successive experiments, Bolton's group injected homogenates from 24 patients with Crohn's disease into more than 400 animals of four species but were unable to demonstrate granuloma formation. They concluded that the universal negativity of their results made it unlikely for a transmissible agent to be universally present in Crohn's disease and thus have a significant role in its pathogenesis.

Cave, Mitchell, Kane and Brooke produced granulomatous changes in NZW rabbits with ileal injection of Crohn's tissue homogenate. This work was extended by Cave, Mitchell and Brooke in 1975. Using an ileal or colonic homogenate from six patients with Crohn's disease, they produced granulomatous changes in nine out of 19 NZW rabbits after injection into the ileum or colon. Macroscopic changes, observed in eight of the 19 animals, included mucosal ulceration and "cobblestone" mucosal changes in association with skip lesions and ileal thickenings with loss of peristalsis and a normal vascular pattern. None of the 22 control animals exhibited a positive response. The lesions in the Crohn's inoculated animals evolved over a period of 12 to 105 weeks. Successful first passage was obtained microscopically in five out of 11 animals and macroscopically in four out of 11 animals with either intravenous or transmural injection.

Characterization of the Agent

Electron microscopy has revealed clusters of bacteria some distance away from ulcerated or obviously diseased bowel and surrounded by unbroken epithelium. In a view of all the negative attempts to isolate bacteria from diseased tissue this finding remains unclear. A viral agent in Crohn's disease is suggested by the animal transmission studies. Mitchell and Rees have completed some preliminary characterization. Their results, using mice injected intravenously or via footpad, indicate that the agent will pass a 220 nanometer filter and is destroyed by sterilization (autoclave). Attempts at viral isolation, although limited, have been fruitless. Although a number of viral agents were recovered, no single viral group was consistently isolated from Crohn's disease tissue, and therefore little if any

etiological significance was attributed to their isolation. Searches for specific anti-bodies to the recovered viruses and attempts at reproducing lesions experimentally with the viruses have also failed.

Newer, improved virologic isolation methods (in this case cocultivation) have been useful in isolating agents not previously culturable. In 1975, Aronson *et al.*, obtained a viral isolate from 16 out of 24 Crohn's disease patients and 14 out of 20 patients with other gastrointestinal disorders. Only one of nine healthy controls, a gastroenterologist, yielded an isolate. Neutralization studies suggest that the isolates are related and of human origin. The ubiquity of what has been characterized as a small, RNA virus among patients with gastrointestinal disease detracts from the possibility that it has etiological significance.

Animal research at St. Michael's Hospital in 1975-1976 has been pursued to investigate the possibility of a transmissible agent in Crohn's disease. A crude homogenate prepared from diseased ileal tissue of a Crohn's patient was injected into the hind footpads of one group of mice and intraperitoneally into a second group of mice. Appropriate controls were established. No granulomas have been found nine months post-innoculation. More recently, mice have been inoculated either via their hind footpads or intraileally with °45, °22, or °1 micron filtrate of Crohn's homogenate. The result of this experiment has not been determined. Short ileal and colonic loop have been surgically isolated in a group of NZW rabbits. The loops were injected with °45, °22, or °1 micron filtrate of Crohn's homogenate. At the time of writing all biopsies have been negative although this experiment is still in its early stages.

Discussion

Current research in the etiology of Crohn's disease is centered around two concepts: immunological mechanisms and transmissible agents. Attempts to demonstrate anergy through skin testing and PHA responsiveness have been conflicting. Many workers have tried to show autoimmunity or hypersensitivity through demonstration of antibody, migration inhibition or lymphocyte transformation to several antigens. The enigma of such studies is to determine whether positive results have etiologic significance or merely represent a reaction to secondary invasion of antigen. A positive reaction to dietary or faecal antigen, or antibodies to reticulin may only demonstrate the normal consequence of a broken epithelial barrier. Similarly, the presence of bacteria or virus in the diseased tissue does not prove that it is the initiating factor. Most recent studies have decreed that the immune defences of Crohn's patients are normal.

Association with other diseases (e.g. ankylosing spondylitis, eczema) and familial occurance suggest a genetic predisposition to Crohn's disease.

Of recent interest is the finding of IgA deficiency in diseased bowel, and normal IgA levels in non-diseased bowel of Crohn's patients. IgA is the most important immunoglobulin in secretion and might play an active immunological role as a mucosal protector. Bull and Tomasi outline several possible relationships between antibody deficiency and intestinal disease. They might be totally unrelated, since some normal people have IgA deficiency. The immune abnormality and gastroenteropathy might be manifestations of the same pathogenic process but have no functional relationship. Immunoglobulin deficiency could contribute through a mechanism such as increased susceptibility to secondary infection, or the immune deficit and intestinal defect could have a cause and effect relationship. That is, antigen that would otherwise be inactivated by immune mechanisms could damage the intestinal mucosa. The presence of such an antigen is supported by the transmissible agent studies.

In various series, granulomas have been reported in anywhere from 37 to 83 percent of Crohn's disease patients. Most patients diagnosed with Crohn's disease fall into several small groups. Reports of immunosuppression and the transmission studies are controversial. This diversity of findings in Crohn's disease may well indicate that it involves multiple etiological agents and/or varying tissue reactivity. ■

An expanded version of this review, with 77 references, is available from the editors on request.

BOOK REVIEWS

Principles of Clinical Electrocardiography, M. J. Goldman, Lange Medical Publications, Ninth Edition, 1976, 412 pages, $10.45.

The ninth edition of a textbook of electro-cardiography, this is a Lange publication and therefore has clear print, copious illustrations (about 500 EKG's), and a thorough, if necessarily perfunctory, treatment of the topic.

Goldman presents EKG's in the most basic way imaginable. The EKG's resulting from myocardial infarctions, for example, are presented with series of painstakingly simply drawn pictures of infarcted hearts showing the evolution of the EKG pattern. In the chapters of arrhythmias he goes so far as to put in extra EKG strips pointing out the P and R waves for us. (Unfortunately the strips of EKG paper are not always in alignment, so that his scheme sometimes creates more confusion than clarification.) There is an appendix at the end of the book with sample EKG "problems"; for example, if you want to know what to do about tall symmetric T's in leads VI-4 you are directed to another section for a discussion of posterior infarcts.

The problem with the book is its uselessness. It is too detailed for someone wanting an introduction to EKGs; it is too sketchy for someone wanting an exhaustive treatment of the topic.

—Frances Frankenburg 7T8.

Surgical Treatment of Congenital Heart Disease, Grady L. Hallman and Denton H. Cooley, Lea & Febiger, 1975, $18.50

This is the second edition of an excellent little textbook on the surgical treatment of congenital heart disease. It provides a brief, concise, well-written account of most congenital heart malformations including information on anatomy, embryology, history, diagnosis, indications for operation, operative technique, complications and results which should be of value to medical students. That it presents essentially the techniques used at the Texas Heart Institute simplifies the text but results in the omission of some operations performed in other centres.

The main strength of the book lies in the superb drawings of operative technique. For this reason it should be most helpful to residents and cardiovascular surgeons unfamiliar with these procedures. For cardiologists, other physicians and paramedical personnel it should provide a clear and simplified reference to the operative techniques used in congenital heart disease.

—G. A. Trusler, M.D.
Division of Cardiovascular Surgery,
The Hospital for Sick Children.

Incomes *(Continued from page 14)*

chosen, i.e. whether 1972 was a typical year or not.

What changes or modifications to our earlier conclusions are suggested by the data? First, it seems that although physicians are able to increase servicing to meet income targets, there are limits on their ability to do so (quality of care, leisure time, etc.). This is suggested by the fact that in each time period there was an absolute decline in real income. Second, there appears to be a start-up problem. The real income loss was almost entirely centred in 1973 which was not the year in which inflation was highest but rather the *first* of the years of high inflation. In 1974 and 1975, although the inflation rate was 11.0 percent in both years, physician income declined by only 1.00 percent (Table VI).

Again, I must caution the reader. These are figures for gross incomes only, and represent all physicians, both full and part-time. The important figures are *net* incomes of *full-time* physicians, figures which are not yet available.

Implications for Public Policy

There appear to be two major areas of public policy to which the foregoing analysis is directly applicable—the use of (1) deterrent fees, and (2) the negotiated fee schedule, as instruments for controlling health costs. With regard to deterrent fees, it seems clear, to the extent that the increases in physician servicing levels are physician-generated and not patient-generated, that the appropriate policy tools should be directed towards physicians, not patients. Deterrent fees would reduce the delivery of medical services to those who were most price-sensitive (i.e. lower income groups). However, unnecessary servicing would only be prevented if medically unnecessary services are clustered among price-sensitive patients. Furthermore, if physicians are able to replace price-sensitive patients with price-insensitive patients, as our analysis predicts they should, net effect is zero on health costs and negative on overall health care.[14] Of course deterrent fees could be made sufficiently high to render all patients price-sensitive. At this point however you would expect to see private insurance emerge again with the attendant loss of effective deterrent.

With regard to the fee schedule, the evidence indicates that a policy of restricting increases in the schedule will not restrain payments to physicians. Total payments to physicians have continued to increase at an average rate of 12 percent per year for two reasons—(1) increases in the supply of physicians have not reduced the servicing by each physician, and (2) physicians are able to alter the mix and level of services to generate income gains independently of price changes. There are simply too many options open to physicians by which servicing can be adjusted. Processes can be subdivided and separately billed. Criteria for billing categories are adjusted so that a 'partial reassessment'

is now a 'general assessment'. Treatment can be protracted over several visits. Physicians may simply stop providing those services which they consider financially unrewarding (e.g. individual psychotherapy). Fee schedules cannot control incomes without the cooperation of doctors.

In earlier times in our profession such a response would have been effectively precluded on ethical grounds—the financial burden on the patient would have been too great. The advent of third-party insurance has relegated these ethical considerations to the background when it comes to financial matters. In fact there seems to be a perverse ethic held by the profession toward the government whereby 'the more that can be extracted, the better'. In the public and private pursuit of our financial interests, we are generating the image of *physician as entrepreneur.*

We might consider for a moment where such a vigorous defence of our current relative income position might lead. If it is clear to the government that negotiated price increases are not an effective control on physician income then the next step is to foreclose some of the options by which physicians are circumventing the constraint. Given the variety of these options one is tempted to use a tar-baby analogy—as one option is foreclosed another is opened up which must also be foreclosed, and so on. Rules are laid down for how many health examinations may be given and what must be included in them, for how much well-baby care may be provided, for how many lab tests may be ordered and for which symptoms, and so on. At each stage the government becomes more and more involved in the administration of medicine and medicine becomes less and less an autonomous self-regulating profession. Control over the content and standards of practice, which is the fundamental criterion of a profession, is transferred from the profession to government. This happens not because the government has any desire to become involved in medical practice but because it is obliged to do so to constrain physician incomes.

Those who have studied the policy problem have identified the alternatives to the preceding scenario—either the profession must become self-regulating with regard to physician income, or some alternative to fee-for-service must be instituted (since most of the incentives to physicians to increase incomes and options by which they can control incomes are dependent on fee-for-service).

I am pessimistic about the potential for self-regulation. Certainly, regulation modelled after the Medical Review Committee in Ontario will not be sufficient. The MRC is designed to detect fraud by examining large deviations from mean incomes.

What is needed is regulation of the mean itself. Thus we might find that short-term accomodation on relative income levels and remunerative mechanisms is a necessary short-term strategy to preserve the long-term integrity of medicine as a profession—where standards and conduct are set on medical criteria and not on administrative criteria. ■

FOOTNOTES

1. The other major contributing factor, of course, is hospital costs which grew at an annual rate of 13.2 percent over the time period 1953-71. This reflects the extensive construction of new hospitals in this period. It is likely that hospital costs continue to represent a significant portion of increasing total health costs as the large wage settlements with staff and nurses are built in. However more recent data on total health costs are not available.
2. Actually insurance raised actual prices to 90 percent of list prices as insurance pays this amount of list prices which doctors then accept as full payment. The advantage to the doctor is that he no longer has to worry about bad debts and collection expenses.
3. M. Feldstein, 'The Rising Price of Physicians' Services' *Review of Economics and Statistics*, 52 (2), 1970.
4. R. Evans, *Price Formation in the Market for Physicians' Services*, Study prepared for the Prices and Incomes Commission, July, 1972 Information Canada, Ottawa.
5. See *Vital Statistics, 1969*, Dominion Bureau of Statistics, Ottawa, 1972
6. R. Anderson and Lee Benham 'Facts Affecting the Relationship Between Family Income

and Medical Care Consumption' in H. Klarman, ed., *Empirical Studies in Health Economics*, Baltimore: John Hopkins, 1970.

7. Canada, Department of National Health and Welfare, 'Expenditures on Personal Health Care in the Provinces of Canada', Research and Statistics Memo, Ottawa, November 1970. Cited in R. Evans, 'Beyond the Medical Marketplace', *op. cit.*
8. P. E. Enterline et. al., "Effects of 'free' Medical Care on Medical Practice—The Quebec Experience," *New England Journal of Medicine*, May 31, 1973, pp. 1152-1155; and 'Distribution of Medical Services Before and After Free Medical Care' *New England Journal of Medicine*, Nov. 29, 1973 pp. 1174-1178.
9. R. Evans 'Supplier-Induced Demand: Some Empirical Evidence and Implications' in *The Economics of Health and Medical Care*, M. Portman, ed. MacMillan.
10. A. Wolfson, *Supply of Physicians' Services*, unpublished Ph.D. thesis, Harvard University, 1975
11. H. Schonfeld, et.al. 'Number of Physicians Required for Primary Medical Care' *New England Journal of Medicine*, no. 286, 16 March, 1972.
12. For the doctor, a battery of lab tests is a time-saving substitute for a long personal consultation; a hospital, with all its services, provides a mechanism whereby the treatment and progress of several patients can be monitored with very little commitment of his own time.
13. There are however some who consider that the continuing medicalization of all aspects of our lives with the concomitant dependency on the medical profession is itself injurious to personal health. See, for example, I. Illich, *Medical Nemesis*, McClelland and Stewart, 1975
14. The data cited earlier (footnote 8) indicate that the substitution of high-income for low-income patients that would follow deterrent fees would increase unnecessary servicing.

Vivisection Pro *(Continued from page 15)*

tion who display an ignorance of computer potentiality only exceeded by their ignorance of biology. A computer is only an idiot who can count on its fingers faster than any other idiot; it does not generate new basic knowledge.

Animals are used in biomedical research and testing, not because the investigator enjoys using animals, but because the animal is, in our present state of knowledge, the only tool available to solve problems of crucial interest to our society. As knowledge is gained, substitutes are readily adopted: the tremendous growth in use of cell cultures in the last two decades is the best indication of the intensity of the search for and acceptance of suitable substitutes. Nevertheless, we are still a long way from our ultimate goal—an understanding of the reaction, interactions, permutations and combinations occurring in the whole living organism, an understanding comprehensive enough to allow us finally to dispense with the animal.

– L. R. Christensen, Ph.D.
Director,
Division of Laboratory
Animal Science,
Faculty of Medicine,
University of Toronto.

Vivisection Con *(Continued from page 15)*

In fact, it should become evident that this practice is so unconscionable that a proposal of boycotting all such exercises is not at all out of order.

Undeniably animals have interests in existence. They have the capacity to suffer, and to experience life with its attendant attributes. We feel they are entitled to equal rights with humans, from the point of view of equal consideration for these interests.

While humans are different from non-humans in many aspects, there is no logical compelling reason for assuming that a factual difference in abilities or overt characteristics justifies any amount of consideration accorded to either's interests. For example, it may be argued that animals are incapable of understanding significance. Even if this is true, the possession of a higher degree of intelligence, of any other parameter for that matter, does not entitle one human to use another for his own ends. Accordingly, it cannot entitle humans to exploit non-humans for the same purpose.

In fact a fully grown dog, cat, or chimp is more rational, more conversable, will have a higher degree of intelligence, self-awareness, and a capacity to form meaningful relationships, than any brain damaged, senile, or severely retarded human. However, the latter have a right to life, while animals are arbitrarily denied this right.

It is sometimes questioned whether animals are truly able to suffer. The literature indicates that animals can and do suffer from pain, as well as acute fear and terror, which often unavoidably precedes any experimentation. Transportation to institutions also causes this type of reaction, as well as injury and even death in some cases. Animals tend to be housed and isolated in cramped quarters, being denied their need to exercise, to groom themselves properly, and to participate in social structures seen in nature.

Does this mean that there are no conditions under which the suffering or sacrifice of an animal can be condoned? Whenever human interests are threatened, directly or indirectly, we act to counter that threat. When the source is human our response is constrained by morality and an elaborate body of law which balances the various rights involved. Compromises are made, and, necessarily, the rights of some are sacrificed. It is not done lightly, or without careful consideration for those who suffer. This same careful consideration is due to animals when their suffering or sacrifice is contemplated as necessary to counter a threat to human interests, whether this threat be direct or indirect.

However, the move from a prescription for considering the rights of animals to its application is a complex task. It is not immediately clear at what point (if ever) the interests of humans override the rights of animals. We do not pretend to have such an answer. Yet there are innumerable instances where the rights of animals are clearly violated. Testing the safety of deodorants by spraying them in the eyes of immobile rabbits whose eyelids have been sewn to prevent their blinking away the irritant is blatantly cruel. In our opinion, the use of animals in teaching medical students also represents such an instance of sacrifice in which a judgement about necessity is equally obvious—it is ill-considered, and unjustifiable. The fact that anaesthetic is usually used does not negate any prior suffering, as previously explained. The pedagogical value is dubious at any rate. To take one of many examples, what is gained by decerebrating more cats every year, when videotapes demonstrating the same condition are not only available, but are also presented? All experiments are described in basic physiology texts, and their human applications have been and will be demonstrated in hospital clinics. In those rare instances where animal subjects are still deemed necessary, videotapes that can be shown year after year more than suffice. The authors, who are medical students, have boycotted all animal labs and demonstrations, and encourage those who agree to consider such an action.

It is not legitimate to argue that the animals used for teaching purposes might have been destined to be sacrificed at the pound. We should neither condone nor cover up the irresponsible behaviour of those 'pet' owners who do not respect the interests of animals.

In closing, we would mention that we have deliberately avoided the argument that treating animals with consideration teaches us to treat people more humanely. This contradicts our central thesis. We ought to consider the interest of animals because they have interests and because it is unjustifiable to exclude them from the sphere of moral concern.

– Gabor D. Kelen,, 7T9
Stu Iglesias, 7T9

FEEDBACK

Motivated by our belief that this Journal should be representative of, and responsive to, the attitudes, interests, opinions, beliefs, whatever, of our readers, we are initiating a 'letters to the editor' column. We hope you will care enough to communicate to us, and, through this vehicle, to your fellow students, your impressions and ideas regarding anything and everything that will appear in the Journal this year. Written comments, signed or not, may be left in our mailbox in the Medical Society Office any time.

So, for a humble beginning, we have the admittedly sketchy results of a rather casual questionnaire we distributed in May, 1976. The response was poor . . . the ramifications of which are open to conjecture. Nevertheless, the feedback we *did* get may interest you, as it did us. The overall opinion of the Journal was not so negative as we were led to believe by what appears now to have been a rather vociferous minority. Still, it highlighted a substantial amount of dissatisfaction with various aspects of the Journal, problems which we are attempting to rectify this year. Our 'dipstick' indicated the following (the proverbial grain of salt is in order):

1. My *overall* opinion of the U. of T. Medical Journal is:
   a) it's terrific 3%
   b) it's o.k. 65%
   c) it's so-so 25%
   d) it stinks 6%

2. The Journal is, on the whole:
   a) pleasing to the eye 52%
   b) blah 45%
   c) offensive to the eye 3%

3. The Journal should have:
   a) more artwork 50%
   b) less artwork 2%
   c) o.k. as is 48%

4. The cover is:
   a) appealing 28%
   b) blah 57%
   c) ugly 16%

5. The print to page relation should:
   a) stay as is 60%
   b) look more like a newspaper 2%
   c) look more like a magazine 39%
   d) look more like a textbook 0%

RE: scientific articles:

6. There should be:
   a) more research articles 9%
   b) less research articles 47%
   c) same as is 45%

7. There should be:
   a) more clinical articles 85%
   b) less clinical articles 5%
   c) remain as is 10%

8. There should be:
   a) more current controversial issues in medicine 80%
   b) less current controversial issues in medicine 2%
   c) same as is 12%

9. These articles:
   a) should somehow be related to medicine 84%
   b) need not be related to medicine at all 16%

OVERALL:

10. I would like to see:
    a) more student-authored articles 37%
    b) less student-authored articles 12%
    c) same as is 51%

11. I would like to see:
    a) more non-student authored articles 19%
    b) less non-student authored articles 37%
    c) same as is 44%

12. Considering everything overall:
    a) I resent contributing nearly ¼ of my student fees towards the support of this Journal 32%
    b) I think one year's subscription to the Journal is actually a bargain at this price 17%
    c) My feelings are somewhere in between a) and b) above 29%
    d) No feelings . . . no comment 22%

13. If I had my 'druthers', I'd:
    a) scrap the Journal 21%
    b) keep the Journal as is 22%
    c) keep the Journal, but with some changes made 57%

14. I read the Journal:
    a) never 13%
    b) occasionally 53%
    c) nearly always 33%
    d) always 0%

15. Sex:
    a) female 36%
    b) male 57%
    c) other 7%

Anonymous comments

I especially resent contributing ¼ of student fees for the Journal.

It should be apparent by this time that the Journal is defunct as a scientific journal. It would be more relevant to maintain the Journal in a form which offers the students an opportunity to share, experiences and ideas—there are lots of *good* medical journals around but few 'magazines' which involve the ideas and experiences of students. I am NOT opposed to spending as much money as necessary to publish the Journal—just give us something useful and interesting.

Poor Questionnaire!! The Journal is junk when you consider the articles written . . . very few per issue and the ones that are, are of little interest to me. I would like to see 90%-plus student authored articles. You could improve the number of authors by making the Journal less rigid—more socially relevant or simple clinical articles.

A few short articles and some columns would likely increase actual readership and perhaps interest students to actually sit down and read the Journal. Quizzes—clinical—such as appeared a year ago.

I do not like shiny paper as it glares too much.

Quite frankly, I think that publishing the Journal with its present frequency is an extravagance that we really don't need. The publication seldom contains more than three or four articles of any length or significance, and we could save a hell of a lot of money by publishing once or twice a year. As far as I can tell, the purpose of the Journal at present seems to be to convince the world that U. of T. Medical School is dreadfully clever and aware of what goes on in the world. Do we really need to spend this much money for something that only a very few people give a damn about anyway?

Why is the Journal so costly?

Why is the Journal so unattractive looking?

Why not use more colors and better artwork?

A final reminder:

You, our readers, are our source of copy. You *are* our copy.

The Journal, at its best and at its worst, is ultimately only a mirror.

—The Editors

Your years at Medical School are the hardest. So how about some help along the way?

Medical Officer Training Plan (MOTP).

A subsidization programme for medical students, known as the Canadian Forces Medical Officer Training Plan, has been approved by the Department of National Defence.

Provisions of the plan.

The Medical Officer Training Plan provides for:

- up to three years academic tuition;
- financial subsidization during your internship;
- monthly pay at 2nd Lieutenant rates for the first, second and third subsidized academic years. Pay during the final intern year is at Lieutenant rates, and upon obtaining your licence, at Captain rates;
- an annual allowance for the purchase of medical books and instruments;
- a substantial allowance for the initial purchase of uniforms;
- 30 days' holiday each year, with pay;
- medical and dental care;
- other benefits and privileges of the Service and a commissioned status;
- a guaranteed position of respect and a good starting salary.

For more information contact your
Canadian Forces Recruiting Centre
25 St. Clair Avenue East
Toronto, M4T 1M2
Telephone: 966-6564

ASK US ABOUT YOU. **THE CANADIAN ARMED FORCES.**